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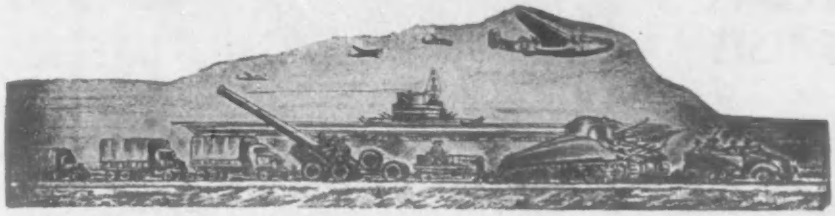

News of the **NOVEMBER** *Issue*

By Norman G. Shidle

Success Can Fail

"THERE is nothing that fails like success."

Most of us tend to bask in the mellow warmth of specific successes until, suddenly looking up, we find that others have gone by and we are alone in a gradually chilling valley. Only exceptional men can see each accomplishment as a step in a never-finished stairway of achievement.

The engineer who finally makes a hot engine cool satisfactorily is less inclined immediately to energize fundamental cooling research than his still-puzzled colleague who needs the research to get even a satisfactory result. An executive's pride in a smooth-working organization can create resistance to change which lasts beyond the time that the organization is efficient.

Success is particularly devastating to the opportunist. Fancying himself as a "practical" man, he jumps for policies which will spark tomorrow – but which may blow up in everyone's face the day after. By the law of averages he plumps for wise plans every so often; opportunism and soundness inevitably coincide occasionally. These temporary and chance successes encourage his belief that expediency is more powerful than principle. Constantly looking for the winning, rather than the right, side of business problems, he never believes in any one thing long enough to make it a permanent success. His every success is an unhappy failure.

Sterility, too, can come from success. More than a few engineers, scientists, and executives – like the worker bee who finally catches the queen – have done their one big job and then quit.

It takes a vigorous and understanding man to succeed successfully.

ENGINES-FUELS RELATIONSHIPS PICTURE IS INTRICATE PUZZLE

FERTILE postwar field for prognostication by engineering crystal-gazers is that of future engines-fuels relationships.

Many more variables attend than in the case of that historic chicken-egg enigma, with its single paramount element of time. Instead, there is a challenging hodgepodge of automotive engineering, petroleum technology, world developments, economics, industrial trends, competition, invention, human nature, and other hazards – interlocking, interdependent, and largely beyond control.

Odds-conscious crystal-gazers can hedge by segregating the area of speculation into engines and fuels. This procedure produces seemingly simple, but basic and pregnant questions:

What will go into engines?

What will come out of the petroleum barrel?

Some of the facts which, properly arranged, aid in answering these questions will be reviewed in November *SAE Journal* by T. B. Rendel, of Shell Oil Co., Inc. Mr. Rendel will regard his job as one merely of placing the parts of this picture puzzle in positions convenient for those who may wish to assemble them. It will be his theory that review of what is happening is helpful even to crystal-grazing, which, he remarks, in this field has proved to be especially hazardous.

Orderly Integration

To assure orderly integration of complicated problems, Mr. Rendel will classify engines as (1) external and (2) internal combustion types. Main problems of the internal combustion type, which he will insist includes those turbines of high-priority military hush-hush, Mr. Rendel will outline as (1) providing a tempting diet of fuel and air in a way which involves the minimum expenditure of energy, and (2) digesting to produce maximum power and elimination of waste.

Aircraft engines will be described as craving fuel of relatively low boiling range, not above 300F, but with good antidetonation characteristics. In the case of commercial aircraft, the problem is complicated by economics, with considerable attention demanded by requirements for minimum specific fuel consumption.

Automotive-type engines will be said to call for fuels distilling up to 380F and for full control of spark timing at all speeds as a critical factor in detonation control. Farm-tractor-type engines will be reported as calling for fuels selected from a boiling range having a 518F ceiling but with their operation plagued by economics fuel taxation, and difficulties resulting from incomplete combustion.

Engines in Competition

High-speed compression-ignition engines, requiring fuel in the boiling range of 350-700F, will be pictured as serious competitors of spark-ignition types, but only so long as they remain omnivorous. Low-speed compression-ignition engines will be said to have much more simple tastes, and to be of aid in consuming the "wastebasket" products of petroleum refining. Possible changes in this situation will be reported as increases in compression and speed and altered fuels requirements. These, Mr. Rendel will say, might put high-speed engines in a less favorable competitive position, lead to early demise of the low-speed.

Developments in the field of the internal-combustion turbine will be described as so generally cloaked in mystery as to preclude informed consideration.

Fuel Supply Adequate

On fuels availability and supply, Mr. Rendel will state his position as optimistic and bullish. He believes that liquid fuels from crude oil will be in amply supply for many years and, thereafter, can be supplemented by fuels from such sources as coal and shale. Alcohol fuels, he will say, have certain philosophical attributes which fade when consideration is given to production costs and to relatively low calorific and Btu values.

Mr. Rendel will explain that it is impossible to ascertain the probable effects of competition and of invention, either in the engines or fuels fields.

He will picture the petroleum barrel as yielding various useful products under the application of such refining processes as topping, a comparatively simple if not too efficient method, and cracking, which, whether thermal or catalytic, will produce the bulk of engine fuels.

DIESEL LUBRICANTS PASS NAVY'S TESTS

TOUGH test of fuels and lubricants has been a byproduct of the operation of U. S. Navy ships during World War II. Reports only now becoming available indicate general satisfaction.

For instance, reports covering heavy-duty diesel lubricating oil state that no cases of bearing corrosion were found in European Theater amphibious operations, which were put under expert observation beginning D-Day. A report on an LST states that engines were in excellent condition after 5000 hr of operation, bearings showing negligible wear, all rings free.

These and other reports of especial interest to petroleum technologists will be analyzed in November *SAE Journal* by Lt.-Com. H. F. Galindo, of the Navy Department's Bureau of Ships. Additionally, he will describe the details and results of tests undertaken to ascertain the effects of salt water on diesel injection systems and to find the proper limits for allowable water content in diesel fuels. Such findings will be said to contribute to progress in the design of filters and water separators, as well as in storage methods.

These tests show, among other facts, it will be explained, that at least 10 hr are required for salt water to settle out of diesel fuel in storage. Fractional contamination has been found to make complete water-settling almost impossible.

Engineering Enigmas Created by Blowers

SUPERCHARGING appears to be among those deceptive undertakings which promise greatly, but which put engineers to no end of trouble producing expected results. On the surface, and in the Sunday supplements, supercharging looks as if it were a short cut to tremendous power and performance, with small engines supercharged to the capabilities of the larger powerplants. In practice, it seems, there are disappointments.

The supercharger merits front-line consideration because of the necessity for increasing specific horsepower output and for maintaining original sea-level output at altitude, R. J. S. Pigott, chief engineer, Gulf Research & Development Co., will explain in November *SAE Journal*.

Supercharging is essential in aviation, he will say, because aircraft power losses are more pronounced than those of ground vehicles. For instance, a supercharger with compression ratio of less than three to one would maintain sea-level power on a 15,000-ft mountain pass, but compression ratio of better than 8:1 is necessary at altitudes around 50,000 ft.

That situation is only introductory to the problem, Mr. Pigott will point out. Next essential is selection of the proper type, either centrifugal or axial turbine, in which pressure ratio is dependent upon intake absolute pressure and relative speed, or the positive displacement type, in which speed determines the volume delivery of free air, but not the pressure.

The Cover

HELPING to build the great dams of our country, the motor truck performs one of its many colorful roles. Providing vehicles to meet the special requirements of moving masses of earth and material has been among the truck engineer's most effective accomplishments.

In this month's cover drawing, Artist Lili Rethi has crystallized the spirit of these vehicles at work.

Balance Propeller To Cure Vibration

TESTS are revealing the way of a propeller with an airplane, specifically as regards the effects of propeller unbalance in causing vibrations, rough operation, control difficulties, and other phenomena. Complications include bending tendencies in wings, fuselage, stabilizers and control surfaces, plus a general shaking up of passengers and parts.

Extensive tests undertaken to ascertain the detailed response of any aircraft to propeller unbalance excitation will be described in November *SAE Journal* by Stanley G. Best, of Hamilton Standard Propellers, Division of United Aircraft Corp.

Mr. Best will report the possibility of simulating flight conditions by suspending an airplane in the hangar and substituting a rotating unbalance exciter for the propeller. He will describe the tests as being so simple, yet so conclusive, as to suggest the advisability of applying them to every new aircraft design.

Experiments have shown that it is possible to remedy difficulties by redesigning engine mounts, adding dampers to stick systems, applying mass force corrections.

Engineers Invest In Byproduct Research

CONSTANTLY surprising aspect of technological progress is the changing importance of various mechanical and operating factors. Indices shift, grow, and diminish in importance. Yesterday's signposts are today's firewood.

It seems only yesterday that some folks measured the quality of gasoline by the amount of chill felt by immersed fingers. Figuratively speaking, it was only last night that the occurrence of detonation in an aircraft engine was interpreted by examination of exhaust flames.

Surprising also is the amount of time and energy which must be devoted to byproduct accomplishments, such as erecting temporary signposts on the road to progress. For example, as John W. Streett, of Wright Aeronautical Corp., will report in November *SAE Journal*, the Wright corporation alone has dedicated no less than 30,000 manhours to developing a device for detecting and evaluating detonation in aircraft engines.

HITCH ENGINE TO "ONE HOSS SHAY"?

OLIVER WENDELL HOLMES probably had some other objective, but in materializing the redoubtable "one hoss shay," if only poetically, he established an engineering goal.

Eventually that goal may prove to be another mirage. Meanwhile, it has solid substance in the minds of engineers seeking to prevent wear, postpone breakdowns, and increase the fatigue strength of materials and parts of modern machinery. For them, the simultaneous collapse of all parts of a complex machine which, until that great moment, had operated harmoniously and satisfactorily, would be an occasion.

Of course, their sights are set for machines which would undergo instant disintegration at some far distant date. Currently, they rely upon estimates of strength, basing their calculations upon service records and such laboratory data as may be available. They recognize that at any unsuspected moment localized and hidden stresses may upset their statistical applecarts.

Aid and solace in this search for enduring strength will be offered in November *SAE Journal* by Charles W. Gadd, Andrew Zmuda, and N. A. Ochiltree, of Research Laboratories Division, General Motors Corp. They will present the results of a joint endeavor to compile and to correlate data, applicable specifically to engines, on the utility of stress analysis methods in calculating a machine's potential longevity.

They will claim no degree of finality for their methods, but they will insist their confidence has been established in the practical utility of current laboratory test methods.

Tests Reveal Data On Engine Cooling

INCREASING the power output of an engine, an in-line aircraft engine, for example, is a complex engineering job involving hosts of factors – and of headaches.

Case in point is the problem of heat dissipation. Nature does a fair job with the smaller engines. When it comes to the big in-line powerplants, however, something has to be added.

That something currently comprises fins attached to cylinder barrels. Steel fins are used, and aluminum. Aluminum fins are preferable, Marcel Piry, of Ranger Aircraft, will report in November *SAE Journal*. They dissipate heat faster.

Mr. Piry will cite the results of tests with similar aircraft engines under equivalent conditions to prove his point. Temperature of an aluminum-finned barrel was only 241F under conditions which produced 299F with steel fins. To maintain an average barrel temperature of 295F, the aluminum-finned barrel required only 60% of the cooling air mass flow, 40% of the drop of static pressure across the baffles, and 25% of the cooling horsepower demanded for the steel-finned barrel.

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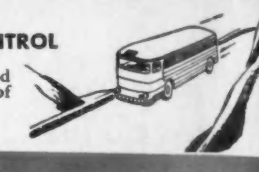

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News..

..OF THE SOCIETY

NEW TECHNICAL BOARD Meets; Study of Organization Starts

BASIC organization and policy were the dominant topics considered at the first meeting of the newly created SAE Technical Board held in Detroit, Sept. 11, 1945.

The Board provided for uninterrupted operation of the Society's widespread existing technical committee activities by authorizing these committees to continue under existing rules and procedures until further notice.

The Temporary Executive Committee, named by President Crawford to plan for the first meeting of the Board, was continued in office until Jan. 1, 1946. This action takes advantage of the familiarity of this group with the organization problems which confront the Board. The Board will elect a permanent Executive Committee at its first meeting next year. The personnel of the Temporary Executive Committee is as follows: Board Chairman L. Ray Buckendale, B. B. Bachman, J. H. Hunt, William Littlewood, R. H. McCarroll and J. C. Zeder.

After detailed discussion of major operating problems and policies, the Board directed the Executive Committee to draft rules and regulations covering the work of the Board, its technical committees and of its executive committee for consideration by the Board at its next meeting. Because of the special problems involved, the Board voted to consider standardization rules separately and appointed J. H. Hunt, chairman of the General Standards Committee, to sponsor this study, giving him authority to organize a committee to develop a report with specific recommendations.

Detailing of the reorganization and realignment of the existing technical committee structure was also referred to the executive Committee for study. Pending the completion of this study, as has been indicated, existing committees will continue to function as in the past. However, on the recommendations of the chairmen of the two committees, the Board took action to disband the War Activity Council and the Ordnance Advisory Committee.

Chairman Bachman of the War Activity Council, after explaining the work of this group, recommended that it be disbanded. The Board accepted this recommendation and expressed the sincere thanks of the Society for an outstanding job. The effect of this action is to make the various war committees directly responsible to the new Board.

Similarly, on the recommendation of Chairman H. W. Alden of the Ordnance Advisory Committee, the Board voted to recommend to the SAE Council that this Committee be disbanded. In taking this action, the Board adopted a resolution recognizing the pioneering work done by this Committee which during the 20 prewar years laid the foundation on which the Society's extensive program of war cooperation with Army Ordnance was reared. The Executive Committee was directed by the Board to explore the problem of peacetime cooperation with Ordnance and report with recommendations as to what organization should be set up to continue this relationship on its present high level of effectiveness.

New Technical Board Members

A. W. Scarratt
Vice-President
International
Harvester Co.

Mac Short
Vice-President
Special Projects
Branch
Lockheed Aircraft
Corp.

FLASH!

·1946· ANNUAL MEETING Will Be Held

THE 1946 SAE Annual Meeting will be held at the Book-Cadillac Hotel in Detroit, Jan. 7-11.

Lifting of all Government bans on conventions as of Oct. 1 cleared the last doubt about carrying through plans for this big meeting – plans, stimulated by the National Meetings Committee, which have been going forward actively ever since V-J Day portended early elimination of Government restrictions on meetings.

As a result of the Meetings Committee's forehanded action, two other national SAE Meetings have been reestablished prior to the Annual Meeting. These are the National Fuels & Lubricants Meeting in Tulsa on Nov. 6 and 7; and the National Air Transport Engineering Meeting in Chicago, Dec. 3, 4 and 5.

The Local War Emergency Meetings Program – which was being carried out as a substitute for national meetings – will be wound up with the holding of two Southern California Section Aeronautic Meetings, one on Oct. 4 and the other on Nov. 1. (These are in addition to the following Local War Emergency Meetings held during August and September: Southern California Section Fuels & Lubricants Meeting, Aug. 24; Northern California Section Transportation & Maintenance Meeting, Sept. 7; Milwaukee Section Tractor Meeting, Sept. 13; and Northwest Section Transportation & Maintenance Meeting, Sept. 15.)

Already in process also are plans for a full-scale program on national meetings throughout 1946, INCLUDING A SUMMER MEETING, scheduled for June 2-7, 1946.

Aero Engine Parts Nomenclature Ready

NOMENCLATURE of aircraft engine parts is a standardization task undertaken by Committee E-12, Handbooks and Publications, of the SAE Aircraft Engine Subdivision, to eliminate confusion caused by general and widespread ambiguity of terminology. It has been published by the SAE as ARP-341.

For example, the committee has recommended the following definitions of aircraft engine parts in a list of 250 where ambiguity exists in common usage throughout the industry:

Bolt: A cylindrically shaped, externally threaded part having a head designed to be turned by a wrench or held by some other part gripping its outer surfaces. Exception to this definition is "clevis bolt." A part having a head which would classify it both as a bolt and also as a screw will be classified as a screw.

The proposal defines a screw thus:

Screw: A cylindrically shaped, externally threaded part having a head designed to be turned by a screw driver or some part fitting into its head. Exceptions to this definition are "lag screw" and "drive screw." A part having a head which could classify it both as a bolt and also as a screw will be classified as a screw.

Another definition included in the proposal is:

Bearing: A tubular part lined with babbit or other bearing material, or employing balls or rollers designed to permit transfer of force to, or provide support for a rotating body with a minimum of friction. Bearings using a lubricant between two sliding surfaces are called "plain bearings" while those using rollers or balls are called "anti-friction bearings." It is recommended that these terms, "plain" or "anti-friction" be used in referring to the two basic types.

Further definitions cover **bearing, ball; bearing, needle; bearing, plain;** and **bearing, roller.**

One of the reasons for working to early completion of the glossary was a request from the Aircraft Industries Association of America, Inc., as the basis of a Spanish-English dictionary of engine terms.

Members of Committee E-12, under the chairmanship of K. C. Mehrhof, Wright Aeronautical Corp., are E. M. Baldwin, Jr., Pratt & Whitney Aircraft; B. Cane, Lycoming Division, The Aviation Corp., and W. M. Tyler, Allison Division, General Motors Corp. Consultants on the project included Elmer I. Rabb, Pratt & Whitney Aircraft; H. T. Dreyer, Continental Motors Corp.; R. Hyland, Allison Division; O. M. Johnson, Aircooled Motors Corp.; R. H. Ortmann, Ranger Aircraft Engines, and Charles Shay, Wright Aeronautical Corp.

Nomenclature Guide for Aircraft Engine Parts (ARP-341) is available from the SAE Special Publications Department, Society of Automotive Engineers, 29 West 39 Street, New York 18, N. Y., for 25¢ to SAE Members and 50¢ to Non-members.

Report on Driving Aids For Veterans Completed

WITH the publication of its final report, the SAE War Engineering Board's Committee on Vehicle Controls for Disabled Veterans won a commendation from W.E.B. Chairman J. C. Zeder. The report contains 97 pages, and is copiously illustrated with drawings and photographs.

The project was requested of the Society by the American Association of Motor Vehicle Administrators, for the Automobile Manufacturers Association in determining industry policy, the Surgeon General of the U. S. Army, and others who may be able to assist in the rehabilitation of men who have suffered amputations in their services during the war.

Headed by L. A. Chaminade, Chevrolet Motor Division, General Motors Corp., the committee immediately made a survey of existing equipment, and then undertook to design driving aids on a "pilot" model.

With the close cooperation of the Office of the Surgeon General, the committee visited nearby hospitals to discuss some phases of the problem with Army surgeons. Based upon the coordinated work, a Chevrolet, Ford, Oldsmobile, Plymouth and a Studebaker were equipped with the SAE devices, and demonstrated before a regional group of motor vehicle administrators in Chicago, June 22; at Walter Reed General Hospital, Washington, D. C., July 11 at the invitation of Major-Gen. Norman T. Kirk, Surgeon General, and at Trenton, N. J., before the eastern AAMVA members on July 3. In all the demonstrations drivers have been amputees from military hospitals.

Members of the committee, serving with Mr. Chaminade, were W. L. Aiken, Autocar Co.; W. J. Allard, Ford Motor Co.; H. B. Currier, Oldsmobile Division, General Motors Corp.; W. A. Frederick, Willys-Overland Motors, Inc.; A. G. Laas, Studebaker Corp.; E. P. Lamb and W. A. Mulhern, Chrysler Corp.; Walter Norris, who was succeeded by H. Murray Northrup, Hudson Motor Car Co.; J. Arthur Nyland, Buick Motor Division, General Motors Corp.; R. H. Phelps, Nash Motors Division, Nash-Kelvinator Corp.; T. H. Thomas, Bendix Products Division, and E. A. Weiss, Packard Motor Car Co.

Members of the steering committee for the project were C. R. Paton, the W.E.B. sponsor, who represented Packard Motor Car Co. and is now with Ford Motor Co.; John H. Hunt, General Motors Corp., who was chairman of that group; R. H. McCarroll, Ford Motor Co., and H. T. Woolson, Chrysler Corp.

Heads SAE Aero Group

WILLIAM C. LAWRENCE chief engineer of American Export Airlines, Inc., has been appointed chairman of the Aircraft Accessories & Equipment Subdivision of the SAE Aeronautics Division, succeeding William Littlewood. He was named vice-chairman about six months ago.

One of the most active members of the subdivision, Mr. Lawrence has participated

William C. Lawrence

in its major policy decisions since returning to industry from his work with the Aircraft Branch of the War Production Board, Washington, D. C.

Mr. Littlewood, one of the organizers of the SAE Aeronautics Division nearly two years before Pearl Harbor, played a major role in the vast standards program requested of the SAE and Industry by the Government. A vice-president of the Society, he resigned because of the pressure of his duties as vice-president in charge of engineering of American Airlines, Inc.

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SAE NOMINEES FOR 1946

President.......L. Ray Buckendale
Vice-President, in charge of Engineering,
Timken-Detroit Axle Co.

Treasurer................B. B. Bachman
Vice-President, in charge of Engineering,
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Membership on SAE Council

Term of 1946-1947

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Assistant Director,
Research Div., Esso Lab.,
Standard Oil Development Co.

C. E. Frudden
Consulting Engineer,
Allis-Chalmers Mfg. Co.

A. E. Raymond
Vice-President, Engineering,
Douglas Aircraft Co., Inc.

CONTINUING on the Council for 1946 will be the following men who were elected for a two-year term at the beginning of 1945: J. C. ARMER, Vice-President, Dominion Forge & Stamping Co., Ltd., and Canadian Motor Lamp Co., Ltd.; FRED C. PATTON, Manager, Los Angeles Motor Coach Lines; R. J. S. PIGOTT, Chief Engineer, Gulf Research & Development Co. Serving on the 1946 Council as Past-Presidents will be J. M. CRAWFORD, Assistant to Vice-President, General Motors Corp.; and W. S. JAMES, Director of Automotive Research, Ford Motor Co.

Vice Presidents:

Air Transport...........Charles Froesch
Chief Engineer, Eastern Air Lines, Inc.

Aircraft.................G. A. Page, Jr.
Director of Engineering, Airplane Div., Curtiss-Wright Corp.

Aircraft Powerplant......Earle A. Ryder
Consulting Engineer, Pratt & Whitney Aircraft, Div. United Aircraft Corp.

Diesel Engine...........H. S. Manwaring
Chief Engineer, Mech. Res. & Development Div., International Harvester Co.

Fuels & Lubricants........J. C. Geniesse
Process Supervisor in Res. & Dev. Dept., Atlantic Refining Co.

Passenger Car................J. E. Hale
Chief Engineer, Tire Div., Firestone Tire & Rubber Co.

Passenger-Car Body...Thomas L. Hibbard
Assistant Director, Body Design Dept., Ford Motor Co.

Production..............Neil A. Moore
Vice-Pres., Gen. Mgr., Sealed Power Corp.

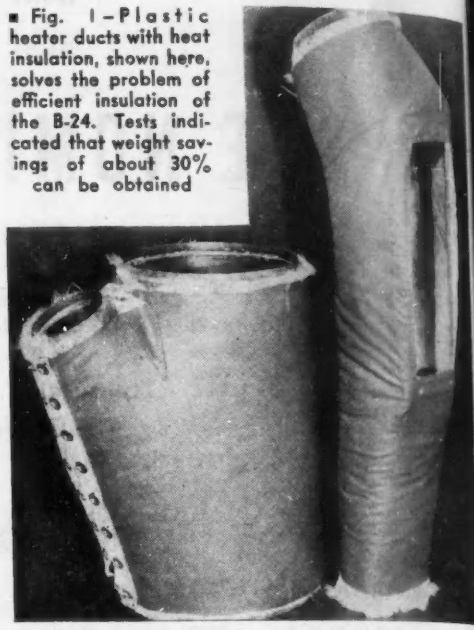
Tractor & Farm Machinery.............E. A. Petersen
Asst. Chief Engineer, Tractor Div., Massey-Harris Co.

Transportation & Maintenance...........Ervin N. Hatch
Sr. M. E., Auto., N. Y. C. Transit System

Truck & Bus............Beverly W. Keese
Vice-Pres., in charge of Engineering, Wis. Axle Div., Timken-Detroit Axle Co.

NEW PRODUCTS ORIGINATED AT WILLOW RUN ADD QUALITY TO B-24

■ Fig. 1 – Plastic heater ducts with heat insulation, shown here, solves the problem of efficient insulation of the B-24. Tests indicated that weight savings of about 30% can be obtained



Digest of paper

by

A. B. RICHARDS

Ford Motor Co.

■ Western Michigan, June 15

(Paper entitled "Materials in Bomber Construction")

MATERIALS selection played such an important part in the function of the B-24 Liberator bomber, declared A. B. Richards, Ford Motor Co., that the Willow Run plant undertook a research project to develop new substances incorporating the desired qualities of lightness, strength, and economy of construction and maintenance.

Mr. Richards described the basic materials used in attiring the B-24 as aluminum and its alloys (of which 61% of the bomber is composed); steels, which go into landing gears and motor mountings; synthetic rubber for fuel cells and tires; fuel and oil; plastics, for turrets and ammunition boxes; copper, bronze, magnesium; sheet lead; and paint.

Experimenting with these substances in order to reduce the airplane's weight as well as cost, the speaker revealed some of the products which Willow Run brought out of its research rooms. They are:

1. Ford Protecto-Kote, an elastic, abrasion-resistant, paint-resistant, transparent coating for the protection of methacrylate panels during assembly operations.

2. Plastic backing plates for fuel cells, replacing sheets of aluminum alloy. The material now used, it was explained, is a low-pressure plastic laminate incorporating two layers of glass cloth and one central layer of 8 oz duck; this change effected a weight saving of approximately 50 lb on each plane.

3. Thermal insulation for heater ducts. A special guarded hot tube is now under construction, said Mr. Richards, which will enable accurate heat loss determinations and expedite final material selections. See Fig. 1.

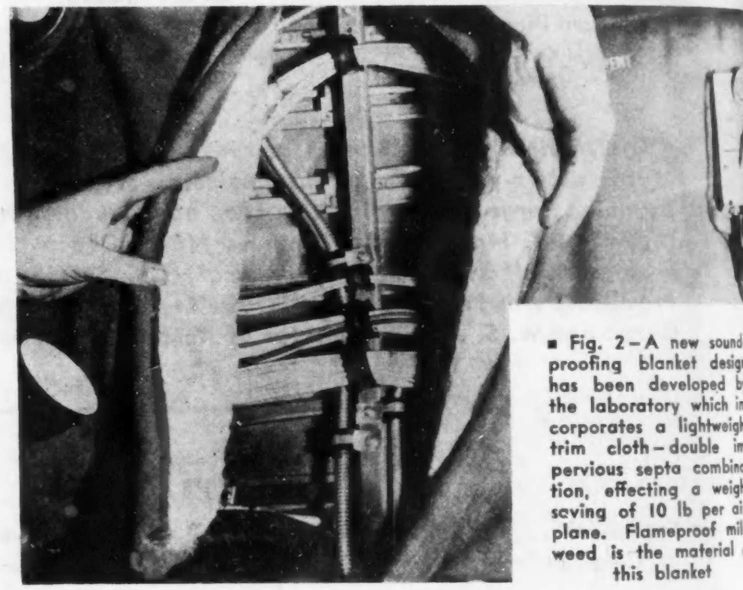
4. Substitution of non-critical soundproofing and development of a new soundproofing blanket design made of flameproof milkweed. See Fig. 2.

5. A new economical method of reclaiming Wood's metal at Willow Run was described by the speaker. Many of the approximately 1800 different aluminum tubes used on the bomber are bent, using Wood's metal filler. Wood's metal is an alloy of 50% bismuth, 25% lead, 12.5% cadmium, and 12.5% tin; all very strategic metals. The melting point is about 150 F. Its cost is about 75¢ per lb.

This soft low-melting filler prevents the aluminum tubes from partially collapsing and acquiring an elliptical cross-section at the bend radius while being bent to the correct angle for assembly. It is common practice in industry to re-use this metal until it has become so contaminated with oxides, slag, dirt, and so forth, as to be unusable.

Metal Reclaimed

"We developed an original method of reclaiming the metal which is so effective that purchase of new metal was completely discontinued," stated Mr. Richards. Thus, it was possible for thousands of pounds of these strategic metals to be diverted to critical war applications, and savings in excess of $200,000 have resulted, it was learned.



■ Fig. 2 – A new soundproofing blanket design has been developed by the laboratory which incorporates a lightweight trim cloth – double impervious septa combination, effecting a weight saving of 10 lb per airplane. Flameproof milkweed is the material of this blanket

Mr. Richards briefly outlined the process as making use of a three-tank refining system in which the first tank removes lighter oxides and slag by gravity. Metal from this tank pours into a second tank containing hydrochloric acid solution through which the metal passes in a thin stream down a series of inclined steps. Here, the remaining oxides are removed by the acid. In the third tank traces of acid are neutralized and the purified metal is cast in pigs. One operator can reclaim approximately 2000 lb in one working day.

6. Ford albond cement is under development in the laboratory which was described as a plastic cement for bonding of metals, rubber, and plastic so as to reduce spotwelding and riveting on production. Although its use is limited to production of sealing spotwelded heater duct seams, more balanced formulations were predicted for the future. This cement will test at 3000 psi in shear, the audience was told.

A plastic cement is now being developed for bonding of metals, rubber, and plastic so as to reduce spotwelding and riveting on production, the speaker disclosed. He told further of a bleeding type of ink which Ford has developed to save labor and restamping. Tests have shown, he said, that identifications are legible after six coats of paint have been applied.

Another startling fact announced by Mr. Richards was that almost three-fourths of the 100 ft of ammunition conveyor track strung through the plane is of many plastic varieties – an indication that these are among the most promising materials of the future.

Use of formed phenolic ammunition track had been under consideration for some time at Willow Run, and many different designs

were submitted and tested before the present installations were approved.

"It may be surprising that comparative ballistic tests really clinched the argument in favor of plastic tracks," the speaker concluded. "When projectiles penetrate a metal track, metallic fingers around the wound lock the ammunition belt and put the gun out of action. Corresponding tests on the plastic track indicated no fingering or flowering whatsoever."

DIMINISHED . . . . . . Weight Smooths Operation Of Electric Motor System

by H. W. ADAMS
and F. FOULON
Douglas Aircraft Co., Inc.

■ Kansas City, June 7

(Excerpts from paper entitled "The Design of Electro-Mechanical Actuating Systems")

IMPROVEMENT in electro-mechanical actuating systems results from reduction in weight and increase in reliability. The weight and reliability of the mechanical portion of such systems is to some extent a function of their strength under rarely encountered overloads, including stalled and impact loads. The weight of the electrical portion is largely a function of duty cycle. By designing for proper duty cycles, weight savings of as much as several hundred per cent can be realized.

The selection of wire size depends upon the heating effect of the current in the wire and the voltage drop permissible for proper operation of the actuator. For intermittent duty service in 24 v systems, an average voltage drop of 2 v is usually encountered. Thus, in a nominal 24 v system, the actuator normally operates at about 26 v.

Small motors are generally controlled directly by switches operated by the pilot while larger motors are controlled through relays or magnetic contactors. The use of a high current capacity switch for directly controlling relatively large motors without the use of relays would be advantageous.

Impact Load Problem Tackled

Unusual loads on parts of the airplane normally come from one of two causes: accelerations in the airplane due to gusts or maneuvering flight, and loads resulting from inadvertent operation under conditions for which the parts are not designed. The first can be calculated and normally is included as part of the design requirements for any electric-motor actuated system.

Another type of impact load which must also be considered is the load resulting from operation as with maladjusted limit switches such as can occur at the time the limit switches are being adjusted. Good design in the airplane can sometimes overcome this handicap by providing non-adjustable limit switches or limit switches with a limited range of adjustment. Operation under these conditions can result in high impact loads when the system reaches the mechanical limits of its travel with the motor still traveling at high speed because of the necessity for rapid deceleration of the armature from high speed to a standstill.

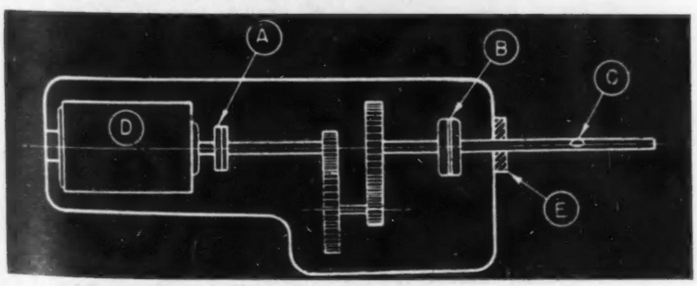
The accompanying photograph shows an electric-motor actuated system using clutches to reduce the torque loads imposed on the system from motor inertia and electrical torque. The clutch shown at "A" represents a lightweight clutch operating at high speed. Since this type of clutch is required to insure quick stopping at the ends of the travel, or sometimes at intermediate positions, it may effectively add no weight to the system. A heavy clutch shown at "B," because of its relatively higher heat capacity and because of the fact that it can usually be set within closer limits, can reduce the loads in the system considerably. At point "C" a shear pin is shown. It is possible to limit the torque by this means; however, its use tends to reduce the reliability of the system since it is necessary to replace the shear pin after each failure, and if set too low, the pin may shear in cold starts.

Clutches Help Limit Load

In studying the effect of operation with maladjusted or disconnected limit switches on strength, and therefore on weight, it can be said that while every system must be investigated, generally where sufficient flexibility exists, no additional means of reducing the inertia loads are required. In the case of stiff systems, either load conscious switching devices or clutches can be used to limit the load applied by the motor to the system.

The reliability of the electrical portion and to some extent the mechanical portion as well, is a function of its resistance to extreme environmental conditions.

Shown here is an electric-motor actuated system using clutches to reduce the torque loads imposed on the system from motor inertia and electrical torque. The clutch shown at "A" is a lightweight clutch operating at high speed. Point "B" shows a heavy-duty clutch. An analysis should be made to determine whether the addition of this clutch results in a weight saving in the specific case. A shear pin is shown at point "C"; a motor at point "D"; and a seal at "E"



Effects of Environment

There are two possible approaches to the problem of protection from the harmful effects of environmental conditions: first, develop by test a ventilated system which will resist the effects of possible combinations of environmental conditions; and second, hermetically seal the apparatus which, although possibly requiring less development, is likely to be heavier. The latter method is far more desirable than partially sealed equipment.

In one sealing arrangement often used in high vacuum apparatus, the shaft through which the motor power is taken out is sealed by flexible metal bellows. A distinct advantage of hermetic sealing of equipment is that it prevents tinkering which, while it is hardly an environmental condition, still produces many failures in electrical apparatus. About the only environmental conditions which cannot be guarded against by the use of hermetic sealing are the effects of electrical variations, temperature, and vibration. The effect of vibration can be minimized where necessary by the use of shock mountings, and the effects of electrical variations and temperature are already fairly well taken care of by the use of motor protective devices of the thermostatic type. Life testing of such equipment should be relatively simple and should give good correlation with service conditions, which is far from being the case with present simulated service testing.

. . . . . BASIC DATA Vital for Efficient Aircraft Maintenance

by R. C. STUNKEL
Lockheed Aircraft Corp.

■ Metropolitan, June 14

(Excerpts from paper entitled "Some Basic Principles of Aircraft Maintenance Economics")

WITH the forthcoming introduction of new types of aircraft, the application of the principle of maintenance economics to a multitude of problems will be necessary. In order to apply analytical methods, the economist must have an accurate supply of data and information recorded from past and present operations.

Logistical and statistical data required for continuous analysis are:

1. A record of daily hours and corresponding miles flown by individual aircraft.

2. A daily record of each aircraft indicating whether serviceable or unserviceable and for what period in the 24-hr operation span.

3. A record of aircraft and engine hours, including periodic line inspection times, engine and propeller times, engine fuel and oil consumptions.

4. Maintenance costs on automotive, ground and building equipment.

The control of maintenance costs is affected by an immediate realization through

logistical data of the source of inefficient maintenance operation. These control sources which afford immediate recognition of inefficiencies are: daily aircraft utilization; maintenance delays; ratio of direct manhours on the ground to hours in the air; exchange frequency of components; maintenance scheduling.

The question of utilization is one which will constantly confront the maintenance economist. While each airline has its own utilization problems due to schedule frequencies, route length and equipment routing problems, it is nonetheless true that the utilization factor is a direct measure of maintenance efficiency. The utilization factor may be selected at any desired figure, and the airline, failing to achieve that efficiency, must rely upon the economist for the necessary corrective measures. Such measures will cost money and the economist will be confronted with the necessity of proving to the airline management that the expenditure of capital is justified.

This may be accomplished by relating the change of aircraft utilization to the change of net profit. Such expenditures may be required for ground equipment, additional inventory, improved systems or any other item which the economist finds necessary to achieving the desired utilization standard.

To evaluate the relation of the change in utilization to the resulting change in net profit, it must be assumed that the airline operation is not up to the desired utilization or that it can absorb the additional utilization in additional revenue operation or that it desires a reduction in fleet size. This analysis is made on the basis of assumed data, and does not reflect factual information.

The net operating income or the gross profit may be increased by either a reduction in cost or an increase in revenue.

To realize the greatest utilization and hence receive the largest revenue from the operation of fleets of 4-engine equipment, a new understanding of the potentialities of careful economic analysis of maintenance problems should be manifest in the industry.

Propellers Planned with Eye to Safety, Ease, and Performance

by C. S. MacNEIL
Aeroproducts Division, GMC

■ Kansas City, Nov. 17

(Excerpts from paper entitled "Propellers and Air Transport")

AWARE that propellers, along with other components of the airplane, must contribute to improved air transport operation, we conducted a series of investigations to study the performance, effect on passenger comfort, and safety features of propellers designed for fighter aircraft.

Regarding performance, propellers used on present installations have been found to give close to peak efficiency at normal operating conditions; however, with improvements in blade design applied to improved powerplant installations, there are indications that propulsive efficiencies can be bettered as much as 5 or 6%.

Shank and profile losses have been reduced by the use of thin shanks, improved pitch distribution, airfoil sections of superior form and thickness ratio, and by proper selection of airfoil camber. Theoretically, swirl losses may be eliminated by the application of dual rotation propellers. Fig. 1 shows a propeller of this type suitable for absorbing 3000 hp up to 20,000 ft. Dual rotation, however, seems to offer little in the transport field at present because of the magnitude of swirl losses necessary to achieve a net performance improvement – which is much in excess of single rotation propellers of sufficient diameter.

The value of a pound of weight saved on a transport aircraft, while of varied opinion, has been judged from $15 to $180 per year. The secret of light propellers is, of course, in the blade, for the hub structure necessary to retain the blade will be proportional to blade weight for a given design. The material which seems to offer the most practical solution to the weight problem in larger propellers is hollow steel, notwithstanding the suggestions for wood, plastics, magnesium, and so forth.

There are two propeller characteristics which affect passenger comfort: roughness and synchronization. Although transport aircraft have used radial engines almost exclusively, in-line engines and extension shaft arrangements will undoubtedly be considered on future designs. All three types of powerplant installations are in use in fighter aircraft, and it has been found that propeller balance requirements vary considerably with the type of installation.

The extension shaft drive presents the worst propeller balance problem, for it is inconvenient to mount extension shaft gear box units with too much flexibility. If submerged engines with extension shafts are to be used in transport aircraft, roughness troubles can be expected to increase unless soft mounts can be provided for the extension shaft gear boxes.

In connection with military aircraft using in-line engines both with and without extension shafts, a rather comprehensive study has been made of propeller unbalances and their effect on the aircraft. These unbalances may be considered in three major groups:

1. Force or static unbalance.

2. Moment or mass dynamic unbalance.

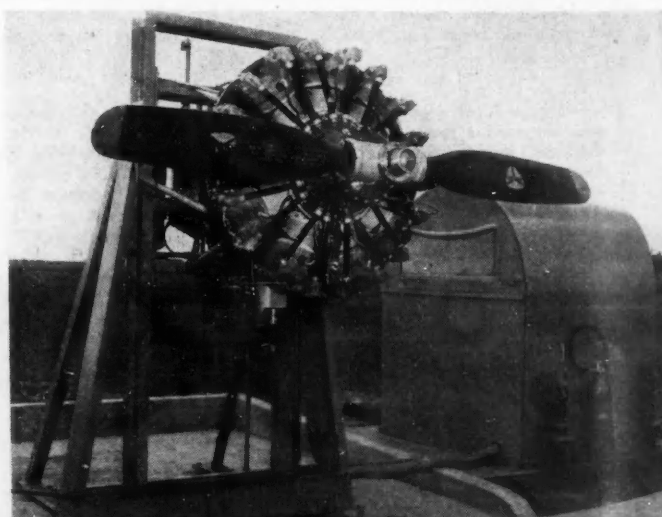
3. Aerodynamic unbalance or unbalance due to effective blade angle differences.

Static unbalance includes not only the tolerance permitted on propeller balancing, but also on cone eccentricity, engine shaft runout, and so forth. Moment unbalance depends on propeller track and mass distribution but is usually small. Aerodynamic unbalance may take the form of either thrust or torque force unbalance. Thrust unbalance is due to one blade creating more or less thrust than the other blades in the propeller, causing a displacement of the net thrust vector from the propeller shaft axis. Torque force unbalance results from different torque loadings on the various blades and a net unbalance of shear at the propeller hub. This unbalanced shear is equivalent to a static unbalance although it cannot be measured by static balancing means.

In order to evaluate the importance of the various types of unbalance possible under current specifications a series of flight tests were run. For these tests a propeller was selected with blades as nearly alike as possible. Propeller frequency vibration amplitudes were measured in flight on this propeller and found to be extremely low. Results of these tests were taken to represent what might be expected with zero unbalance in the propeller.

Most methods of assessing aerodynamic balance indicate that one degree of blade angle difference is the worst likely to be encountered. A value of 1000 oz in.[3] has been picked as representative of mass

■ Fig. 2 – Negative Pitch Propeller



moment unbalance from tests on dynamic balancing machines capable of turning a complete propeller. The value of 36 oz in. static unbalance comes from engine shaft run-out tolerances, front cone tolerances, and propeller balancing tolerances.

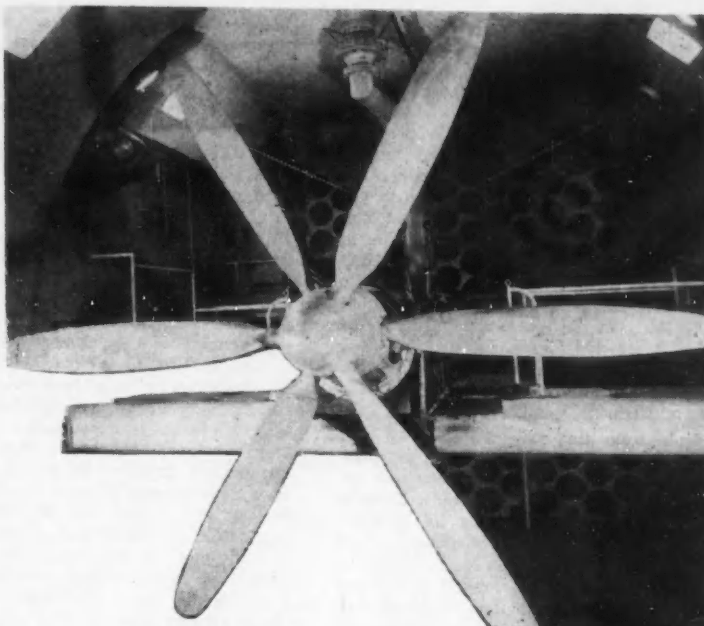
Two approaches have been made to the problem of aerodynamic balance:

1. To eliminate or correct the error in blade pitch distribution by giving blades a differential angle setting in the propeller assembly.

2. Accept the pitch distribution errors and correct for them by introducing a correcting counter unbalance to the assembled and installed propeller.

For straight and level flight in smooth weather, synchronization depends on the fineness with which each propeller can maintain speed. Flight testing has indicated that the governed propeller can be held within 2 rpm and that for normal cruise conditions this is more than close enough to keep engines synchronized and avoid noticeable beats. In rough air, changes in blade angle necessary to maintain satisfactory engine synchronization require a relatively high rate of pitch change for small off-speeds. Results of tests on governor operation in flight under conditions of rapid acceleration and deceleration show that: a rate of deceleration of 11.6 mph per sec (0.53g) from 300 mph to 220 mph resulted in a propeller off-speed of only 9 rpm, while the following acceleration of 13.6 mph per sec (0.62g) resulted in only 13 rpm overspeed.

Fundamental to safe operation is the use of adequate safety margins with an accurate knowledge of operating loads and conditions and their relation to the strength and performance capabilities of a product. Two years ago the minimum fatigue strength of the steel propeller blade in bending was 16,000 psi, and at that time peak operating stresses as determined from vibration surveys ran up to 12,000 psi. In two years the permissible vibration stress level has risen 60% while the margin of safety even at this higher stress is over twice as great. These improvements have resulted from a painstaking program of investigation of secondary stress phenomena and metallurgical factors affecting the fatigue strength of the blade, and by the application of this knowledge to processing changes which guarantee consistent improved quality.



■ Fig. 1 – Dual Rotation Propeller

Although service experience with the propeller has been confined to non-feathering installations, considerable testing both on the ground and in flight has been carried out on a modification of the design which provides instant feathering and unfeathering. One of the tests conducted to prove the reliability of the accumulator feathering system was carried out by removing a propeller from the engine after a test run with the accumulator fully charged. The propeller was stored in this condition for a period of 16 days, at which time the propeller was feathered and unfeathered in the normal manner.

Negative Pitch

The effectiveness of negative pitch for landing run braking depends on the speed with which the change can be made from the positive to the negative regime. For example, a reduction in time to reach negative pitch from 5 sec to 1 sec after making ground contact will reduce the landing run 18%. Fig. 2 shows a test stand installation of a feathering negative pitch propeller capable of going from positive to negative pitch at a rate of 45 deg per sec.

Design Changes Imperative in Attacking Spin-Stall Accidents

by R. B. MALOY
Civil Aeronautics Administration

■ Detroit, May 7

(Excerpts from paper entitled "A Resume of Desirable Characteristics for Non-Stalling Non-Spinning Airplanes")

THE greatest single item requiring design attention for future private airplanes is the stall and spin characteristics, with particular emphasis on the former.

In order to attack spin-stall accidents, the following requirements should be heeded:

1. There should be inherent in the airplane positive and adequate warning of the approaching stall in both straight and turning flight.

2. There should be no tendency to spin from a full stall.

3. There should be no rolling prior to or simultaneous with pitching. Failing that, the motion should be controllable back to level flight.

4. To eliminate turn-stall accident, it should be possible to execute a sustained 60 deg banked turn with or without power, using full-up elevator, with simultaneous application of full rudder in either direction without spinning and with no reversal of control force.

All two-control airplanes should incorporate independent aileron control systems. This is necessary in order to afford a degree of safety comparable to that of conventional three-control airplanes where either the aileron or rudder system ceases to function.

The next approach to the stall-spin problem is through providing an adequate rate of climb. It is proposed that "the steady rate of climb at sea level with not more than maximum except take-off power shall not be less in feet per minute than 10 times the measured power-off stalling speed with flaps and landing gear retracted or 500 fpm, whichever is greater."

The connection between stalling accidents and rate of climb may not be apparent at first glance, although many have been convinced that during the take-off of airplanes with low rates of climb, a very high level of skill is required in order to climb successfully without stalling the airplane. Several studies of the accidents statistics will, it is believed, bear this out.

Accident Record Reviewed

A study was made of the spin-stall accident record of three of the popular light planes for the years 1939 and 1941. Information was available relative to the rates of climb of the different models, the total number of registered aircraft of that type, and the number of stall-spin accidents for each make and model. In 1939 there were very few aircraft which had rates of climb in excess of 500 fpm, and there was also a

considerable variation in the accident rate per thousand airplanes for the three different models, this factor being attributable to the difference in stall characteristics of the individual aircraft. There is, however, a definite indication of decrease in the stall-spin accident rate with increased rate of climb. The year 1941 further verifies this trend as the accident rate in the 400 to 500 fpm rate of climb group is less than half of that in the group with rates of climb of 300 to 400 fpm, and the rate for the group having 500 or more fpm was approximately 25% less than the 400-500 group and about 66% less than the 300 to 400 group. This study conclusively indicates that rates of climb are a definite factor which cannot be overlooked in any consideration of the stall-spin problem.

Aside from the stall-spin phase of this item of our specification, it should be borne in mind that the required rates of climb are specified at sea level under standard conditions. The average altitude of airports through the United States is about 2500 ft and the outside air temperature is known to reach values in excess of 100 F at airports of almost any altitude. It is estimated that the typical light airplane at an altitude of 2500 ft at a temperature of 100 F will have a rate of climb approximately 150 fpm less than the available rate at sea level standard conditions. This may be further reduced by turbulent air and slight decreases in power. This also indicates the desirability of providing a greater rate of climb under standard conditions.

The steady rate of climb with the critical engine inoperative, the propeller stopped, all other engines operating at the maximum except take-off power available, at the altitude, the landing gear retracted and the flaps in the most favorable position shall not be less than 100 fpm at a standard altitude of 5000 ft. It is realized that there are airplanes operating which will not meet this requirement and that there has been very little concern over the problem until recent date. This concern has been primarily prompted by the fact that it has been necessary to certificate some large and heavy airplanes which were incapable of climbing with one engine inoperative at sea level which is permissible under existing regulations. It is believed that airplanes such as these are potentially more dangerous than a single engine with the same wing and power loading for the reason that the probability of engine failure is at least twice as great and, in the event of its occurrence, a serious control problem is introduced which is not present in single-engine airplanes. In larger and heavier airplanes failure of an engine during take-off would create a serious hazard to lives and property of innocent persons living in the neighborhood of the airport of take-off due to the comparatively great amount of kinetic energy involved in the forced landing or crash bound to ensue. There appears also to be a psychological factor involved in that most persons expect a multi-engine aircraft to be able to fly with one engine inoperative, and it is believed that this presumption governs the behaviour of most of these persons whether supported by the actual performance of the airplane or not.

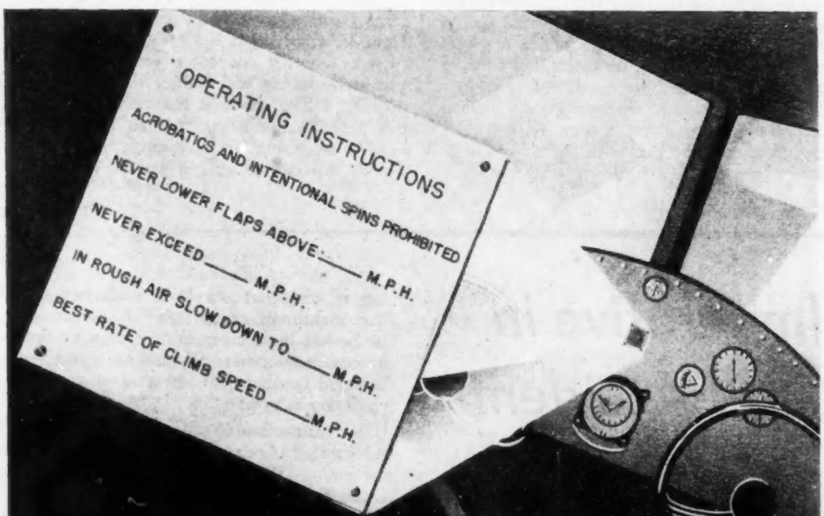
The next item concerns the ease of handling of the aircraft in the air and its ability to fly with a minimum of attention from the pilot. In this respect it is felt that the airplane should be statically and dynamically stable throughout the speed range of the aircraft, both with controls fixed or with controls free. The plane should have a stable landing gear with no trick landing or taxiing characteristics. It should be easily controllable on the ground and equipped with brakes which produce no dangerous tendency to nose over in any operation condition reasonably expected. All landplanes should be satisfactorily controllable with no exceptional degree of skill or alertness on the part of the pilot in normal landings, during which brakes or engine power are not used to keep a straight path.

Cautions Propeller Protection

Propeller protection is another item which has not been too great a source of difficulty up to this time, but it is anticipated that a wide use of the airplane will result in a large number of accidents unless some provision is made to protect the unwary. Probably the best answer to this problem thus far has been the twin-boomed pusher arrangement.

There are many other points which should naturally be considered, such as ease of maintenance, solving the weight and balance problem of the family airplane, comfortable and roomy cabins with emphasis on cleanliness, water tightness, low noise level, slow landing speeds, additional cruising range, adequate lights, ability to utilize small landing strips, and reliability and safety in operation under near instrument conditions. The plane should also carry a permanent, prominently displayed operating instruction chart which would prohibit all acrobatic maneuvers including intentional spins, and which should list the "never exceed" speeds, flaps up and down, a rough air speed corresponding to a 45 fps gust, and the best rate of climb speed. See accompanying photograph.

All of these items are not only possible of realization – they are an eventual *must.*



Operating instruction sheet, like the above, should be prominently displayed as a reminder to the pilot to avoid all acrobatic maneuvers

DISCUSSION

IT is certainly desirable to do everything possible to provide the non-stall, non-spinning type of airplane, according to Mac Short, vice-president, special projects branch, Lockheed Aircraft Corp., who suggests that another approach to the problem of preventing stall under normal conditions, and providing quick recovery under actual stall conditions, would be the use of an airfoil with a relatively constant value of lift coefficient at large angles of attack.

An airfoil of this type, he predicted, would be inherently free of the negative slope of the lift curve at large angles necessary for the auto rotation of spinning.

"The provision of adequate excess power is believed to be of considerable importance, particularly in view of the possible use of small landing strips or parks," he said. "Perhaps the importance of take-off requirements over an obstacle, which apply more directly to the maximum angle of climb rather than maximum rate of climb should be emphasized."

Mr. Short suggested study of design and design requirements to reveal faults which are not at present apparent.

Another speaker complimented Mr. Maloy for avoiding the phrase "foolproof plane" in his report.

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Check List of SAE Meetings Papers

Here are listed those papers presented before National and Section Meetings of the Society of Automotive Engineers, which are still available in mimeographed form.

The SAE policy, in respect to mimeographed copies of these papers, is to make them available for at least one year after presentation.

The following papers, divided under four general headings for your convenience, are available at 25 cents to SAE Members and 50 cents to Non-Members. Quantity lots of more than 10 papers by any one author may be had at reduced rates. Ten or more mimeographed papers of any one title are available at reduced rates from the Special Publications Department, Society of Automotive Engineers, 29 West 39 Street, New York 18, N. Y.

Vehicles

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Austen, Robert N.	Maintenance Engineering of Chassis Leaf Springs	May 9, 45
	Boebinger, Maj. E. J.	Testing of Automotive Equipment at Aberdeen Proving Ground	Oct. 11, 44
	Burke, John D.	The Practical Postwar Car — Report of Automobile Body Survey Conducted by the San Francisco Examiner	Jan. 8-12, 45
	Burkhalter, R. R.	Truck & Bus Transmissions	Oct. 10, 44
	Churchill, H. E.	The Weasel	March 19, 45
	Colby, Col. J. M.	Contributions of Industry to Ordnance Tank-Automotive Engineering	Jan. 8-12, 45
	Collins, Tom J.	Post-War Diesel Engines	Feb. 12, 45
	Colwell, A. T.	Alcohol-Water Injection	Jan. 8-12, 45
	Colwell, A. T.	Fuel Requirements for Farm Tractors	Sept. 13, 44
	Davis, Francis W.	Power Steering for Automotive Vehicles	Jan. 8-12, 45
	Fageol, L. J.	Possibilities & Limitations of Post War Bus Design for City Transportation	Dec. 14, 44
	Fageol, F. R.	Advantages of Multi-Power Plants in Motor Buses	Jan. 8-12, 45
	Ford, Lee H.	Recent Developments in One-Man-Operated Farm Machines	Feb. 1, 45
	Gohn, E. P.	Post War Truck Selection & Conditioning	Feb. 12, 45
	Gohn E. P.	Cold Starting & Fleet Operation	Jan. 8-12, 45
	Hebert, Gordon	The Practical Postwar Car — Report of Automobile Body Survey	Jan. 8-12, 45
	Herold, Richard	Supercharged Two-Stroke Cycle Diesels	Nov. 9, 44
	Horine, Merrill C.	Engineering Features of an Off Highway Truck	Jan. 19, 45
	Hunt, J. H.	The Future of SAE Automobile Standards	Jan. 8-12, 45
	Jackman, George	Truck Refrigeration	Nov. 10, 44
	Kettering, C. F.	Fuels and Engines for Higher Power and Greater Efficiency	Jan. 8-12, 45
	Kishline, F. F.	Probable Post-War Automobile Design Trends	Dec. 1, 44
	Lautzenhiser, F. B.	A Non-Technical Discussion of Diesel vs. Gasoline Power Plants in Motor Trucks	Jan. 8, 45
	Liggett, John T.	Air Cleaners on Crawler Tractors	Oct. 10, 44
	Peirce, T. H.	Bonded Rubber Torsional Vibration Dampers for Diesel Engines	Jan. 8-12, 45
	Pierce, Bert	The Practical Postwar Car	Jan. 8-12, 45
	Rendel, T. B.	Post War Internal Combustion Engines and Their Fuels	Dec. 14, 44
	Taussig, W. A.	Bus & Truck Power Plant Periodic Maintenance	Sept. 21, 44
	Vincent, E. T.	Piston Development Review	Jan. 8-12, 45
	Werner, R. M.	Possibilities of Multiple Power Plants in Motor Trucks	Jan. 8-12, 45
	Wilson, H. D.	Report of Automobile Body Survey conducted by the Chicago Herald American	Jan. 8-12, 45

Aeronautics

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Anderson, R. L.	Effect of Airplane Design on Maintenance	Nov. 17, 44
	Ayres, Arthur	Airports as Affected by Aircraft Performance & Weight	Jan. 8-12, 45
	Bachle, C. F.	Some Possibilities of Turbine Compounding with the Piston Engine	Jan. 8-12, 45
	Beal, G. F.	Making the Cockpit Practical	Jan. 8-12, 45
	Beard, M. G.	Future Operational Requirements in Relation to Cockpit Design	Oct. 5-7, 44
	Bergen, Com. J. J.	Some Observations on the Financing of Local Air Transport	Jan. 8-12, 45
	Brewster, J. H.	Fundamentals of Flight Induced and Forged Cooling	Oct. 5-7, 44
	Brown, Merle; Hoffman, Luther; Griffin, J. R., Jr.	Cockpit Lighting	Nov. 17, 44
	Brown, R. W.	Research & Tomorrow's Aircraft Undercarriage	Oct. 5-7, 44
	Burton, E. F.; Wood, Carlos	The Design of the DC-4/C-54	Oct. 5-7, 44
	Campbell, Kenneth	Some Advantages and Limitations of Centrifugal & Axial Aircraft Compressors	May 7, 45
	Campbell, Kenneth	Engine Cooling Fan Theory & Practice	April 5-7, 44
	Carroll, W. F.	Airports in Southern California	Jan. 11, 45
	Chase, Capt. J. H.	Analytical Fuel Reserve Systems for Long Range Aircraft	Oct. 5-7, 44
	Clyne, James W.	Converting Military Aircraft for Commercial Use	Nov. 16, 44
	Colin, Lt. R. J., Jr.	Electronic Controls in Aircraft	Jan. 8-12, 45
	Costa, Philip J.	Detonation in Flight — Its Effect on Fuel Consumption & Engine Life	Jan. 8-12, 45
	Cunningham, J. W.	High Conductivity Cooling Fins for Aircraft Engines	May 1, 45
	Dietrich, F. J.	Aircraft Riveting & Equipment	May 1, 45
	Dircksen, Maj. A. D.	Aircraft Lighting	Jan. 8-12, 45
	Dolza, John	Coordination of Fluid Coupling Driven Auxiliary Supercharger Speed to Engine Manifold Pressure	Jan. 8-12, 45
	Edwards, M. L.	Performance of the Air Oil Separator in Engine Breather Systems	April 24, 45
	Etchells, E. B.; Underwood, A. F.	Silver Bearings	May 7, 45
	Field, Howard	Reduction of Vulnerability of Aircraft Hydraulic Systems	April 19, 45
	Fleyd, Thomas N.	Aircraft Environment, Thermal Effects	Oct. 5-7, 44
	Foley, E. J.	Planning for Post War Air Transportation	Oct. 10, 44
	Foster, J. N.	Application of High Production Methods to Reduced Production	Oct. 5-7, 44
	Fraas, Arthur P.	Flow Characteristics of Induction Systems	Jan. 8-12, 45
	Friedlander, J. W.	Operating Costs of Personal Airplanes	May 7, 45
	Gardiner, Duncan B.	Electronic Analysis of Airplane Hydraulic Braking Systems	Jan. 8-12, 45
	Gates, Hon. A. L.	Naval Aviation Today in the Pacific	Feb. 5, 45
	Gordon, Kenneth	Control Cabin Development	Jan. 8-12, 45
	Gray, H. C.; Jenny R. W.	Chafing on Aircraft Engine Parts	April 5-7, 44
	Gregg, David	Cabin Superchargers	Oct. 5-7, 44
	Harris, Col. H. R.	History & Development of the Air Transport Command	Sept. 14, 44
	Herrmann, K. L.	New Light Weight Power Plants for Post War Airplanes	Nov. 9, 44
	Hicks, R. D.	Service Experience with Light Aircraft Engines	May 7, 45
	Houghton, Maj. R. M.	Development of Plastic Materials for Aircraft Construction	Oct. 5-7, 44
	Johnson, Ralph S.	Coordination of Flight Deck Duties on Large Airplanes	Oct. 5-7, 44
	Kelly, R. D.	A Means of Warning of Incipient Breakdown of Smooth Air Flow of Airfoil Surfaces	Oct. 5-7, 44
	Kendrick, J. B.	Applied Aero-Economics	Jan. 8-12, 45
	King, W. J.	Axial Versus Centrifugal Superchargers For Aircraft Engines	May 7, 45
	Klein, Dr. A. L.	Fundamentals of Airplane Design	April 5-7, 44
	Knight, William	Stresses in Disc Wheels	April 5-7, 44
	Loomis, R. C.	Cruising Control of Transport Aircraft	Oct. 5-7, 44
	Loudenslager, O. W.	Structural Model Testing	May 1, 45
	Lusk, Capt. R. J.	Protection of Electrical Systems on Military Aircraft	April 24, 45
	McCarthy, C. J.	Aircraft Manufacturing and Air Transport	Nov. 16, 44
	McFarland, F. R.	Aircraft Engine Gears	May 7, 45
	MacNeil, C. S.	Propellers and Air Transport	Nov. 17, 44
	Magruder, P. M.	Future Trends in Intercontinental Transport Aircraft	Jan. 4, 45
	Maloy, Raymond B.	A Resume of Desirable Characteristics for Non-Stalling, Non-Spinning Airplanes	May 7, 45

Aeronautics Continued

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Mentzer, W. C.; Mitchell, E. C.	Cargo Tiedown and Stowage	Dec. 4-6, 44
	Michael, M. L.; Silber, S. R.	High Altitude Factors in Flight Testing	Oct. 5-7, 44
	Mitchell, Col. C. H.	Development of Military Aircraft During Wartime	Dec. 15, 44
	Moon, C. L.	Mechanized Handling of Airplane Cargos	Dec. 4-7, 44
	Mullen, H. A.; Boelter, L.	Aircraft Spotwelding at Willow Run	May 1, 45
	Nutt, Arthur	The Future of Standardization in the Aeronautical Industry	Jan. 8-12, 45
	Parks, M. J.	Cargo Airplane Accessories	Dec. 4-6, 44
	Parvin, D. R.	What About the Age of Flight? Air Transportation in the 5 years to follow the war.	Jan. 5, 45
	Piry, Marcel	Single Cylinder Engine High Altitude Cooling Tests	May 1, 45
	Prewitt, R. H.	Basic Factors of Helicopter Design	Jan. 8-12, 45
	Rawdon, Herb	Wood Versus Metal Aircraft Construction	Oct. 28, 44
	Rawdon, Herb	Requirements of the Feeder Line Airplane	Dec. 4-6, 44
	Rea, James B.	The Operation of Consairway by Convair has Influenced Post War Aircraft Design	Nov. 16, 44
	Reichel, W. A.	War Lessons in Testing of Accessories & Instruments	Oct. 5-7, 44
	Richards, W. M. S.	The Prediction of Engine Cooling Requirements by a Graphical Method	Oct. 5-7, 44
	Robinson, Ray	The Postwar Market for Personal Planes	May 7, 45
	Rose, B. A.	Humidity Effects on Airplane Equipment Performance	Oct. 5-7, 44
	Rudd, J. K.; Heath, Westcott	Radio Interference and the Aircraft Engine	Oct. 5-7, 44
	Schirtzinger, J. F.	The Development of Spar Caps with Integral Fittings	Oct. 5-7, 44
	Schleicher, R. L.	A Current Outlook on the Effects of Dynamic Loads on Aircraft	Oct. 5-7, 44
	Sheets, J. H.; MacKinney, G. W.	Reverse Thrust Propellers for Use as Landing Brakes for Large Aircraft	Oct. 5-7, 44
	Shue, G. S.	Compressibility	Sept. 19, 44
	Smith, G. G.	Crewless Craft	Dec. 4, 44
	Smith, Robert L.	Potentialities of Air Cargo as a Merchandising Aid	Jan. 11, 45
	Stafford, Paul H.	Trends in Airport Runway Design	Jan. 8-12, 45
	Streett, John W.	The Detection of Detonation & other Operating Abnormalities in Aircraft Engines by Means of Special Instrumentation	Jan. 8-12, 45
	Tsongas, A. G.; Macomber, F. S.	Cost Planning the Postwar Small Airplane	Oct. 5-7, 44
	Wachs, Miller A.	Building Utility into the Helicopter	Feb. 7, 45
	Warner, Edward	International Airworthiness Standards	Jan. 8-12, 45
	Weick, Fred	Four Years of Simpler Flying with Ercoupes	Oct. 5-7, 44
	Wheeler, W. L.	Oil System Problems at High Altitude	Oct. 5-7, 44
	Williams, G. L.; Miller, A. B.	Primary Balancing of Radial Engines	Jan. 8-12, 45
	Wolfe, Thomas	Shipping by Air	Dec. 4-6, 44
	Wood, Carlos; Croshere, A.B.	A Proposal for the Establishment of Commercial Air Cargo Service	Dec. 4-6, 44
	Wooton, J. A.	Manufactured Goods, Including Merchandise	Dec. 4-6, 44

Fuels and Lubricants

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Ambrose, H. A.; Trautman, C. E.	Engine Oil Foaming	Jan. 8-12, 45
	Becker, C. F.	Gasolines — Past, Present, Future	Dec. 1, 44
	Brabbs, Lt. A. D.	Testing Heavy-Duty Lubricating Oils for Naval Service	Nov. 9-10, 44
	Britton, Maj. S. C.; Schlesinger, W.	Military Aircraft Grease Lubrication	Nov. 9-10, 44
	Effmann, Karl H.	Engine Oil Consumption Determination	March 8, 45
	Galindo, Lt. Com. H. L.	Navy Experience With Diesel Fuels & Lubricants	May 17, 45
	Georgi, Carl W.	Detergency or Dispersancy in Heavy Duty Engine Oils	Nov. 9-10, 44
	Holaday, W. M.; Mount, W. S.	Discussing the Fuels and Lubricants Supply Problem	May 15, 45
	Keyser, Paul V.	Progress Report on Gear Oils Projects-CRC	Jan. 8-12, 45
	Penfold, Norman C.	Some Comments on Engine Testing of Heavy-Duty Oils	Nov. 9-10, 44
	Pigott, R. J. S.	Considerations Affecting Fuels & Lubricants from the War Work	Jan. 16, 45
	Ronan, J. T.	Motor Oil Performance	Dec. 11, 44
	Savard, A. J.	Fuel Vapor Recovery	Feb. 20, 45
	Wright, W. A.	A Survey of Past & Present Trends in Lubricating Oil Additives	Nov. 9-10, 44

Miscellaneous

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Aufmuth, R. B.	The Practice of Power Metallurgy	March 12, 45
	Erwin, Wesley S.	The Sonigage, A Supersonic Contact Instrument for Thickness Measurement	Oct. 5-7, 44
	Foster, J. N.	Application of High Production Methods to Reduced Production	Oct. 5-7, 44
	Jackson, P. B.	Aluminum After the War	March 14, 45
	Osborn, H. B. Jr.	Tocco Hardening	Jan. 8-12, 45
	Painter, Richard; Huber, Paul	Technique for Practical High Speed Motion Pictures	Jan. 8-12, 45
	Porter, F. P.	Methods for Calculating Torsional Vibration	Jan. 8-12, 45
	Sanders, Morris	Wartime Fabric Developments of Significance to the Automotive Industry	Jan. 8-12, 45
	Somes, Howard E.	Induction Heat Treatment of Internal Surfaces as Applied to Automotive Industries	Jan. 8-12, 45
	Strothman, E. P.	Some Cases for Steel as a Material	Jan. 8-12, 45
	Swoboda, L. F.	Advantages & Characteristics of Light Metal, Permanent Mold Castings	Oct. 5-7, 44
	Riesing, E. F.	Synthetic Rubber Mechanical Parts in Present and Postwar Vehicles	Jan. 8-12, 45

Limited supply of older SAE Meetings Papers in mimeographed form are also available. A permanent file of SAE Meetings Papers is kept in the SAE Library, from which photostatic copies can be made, upon request, at cost.

Also available are the following Special Publications at prices shown:

"Drafting Room Practice in Relation to Interchangeable Components," by C. A. Gladman, National Physical Laboratory, England; 16 pp., illustrated; *25¢ to SAE Members, $1.00 to Non-Members.*

"Engine Deposits: Prevention & Removal," a report by a committee on this subject, sponsored by the SAE Transportation & Maintenance Engineering Activity; 4 pp., illustrated; *25¢ to SAE Members, $1.00 to Non-Members.*

"For the Sake of Argument," a selection of editorials by Norman G. Shidle, executive editor, *SAE Journal; 50¢ to Members, $1.00 to Non-Members.*

"Process Control of Aluminum Foundry Procedure," a progress report No. 1 by a group of committees of the SAE War Engineering Board; 170 pp., illustrated; *$1.00 to SAE Members, $2.50 to Non-Members.*

"SAE Journal Editorial Style Sheet," 20 pp., paper cover. *SAE Members 50¢, Non-Members $1.00.*

"Combined Leaf and Helical & Spiral Spring Manual," SAE War Engineering Board report; 126 pp., 8½ x 11 in., illustrated with drawings and charts; materials and manufacturing specifications; *$1.50 to SAE Members, $3.00 to Non-Members.*

"Manual on Design & Manufacture of Volute Springs," SAE War Engineering Board report; 27 pp., 8½ x 11 in., paper cover, illustrated with drawings and charts; *$1.50 to SAE Members, $3.00 to Non-Members.*

SAE Coming Events

National Meetings

FUELS & LUBRICANTS, Nov. 6-7, Mayo Hotel, Tulsa

AIR TRANSPORT ENGINEERING, Dec. 3-5, Edgewater Beach Hotel, Chicago

ANNUAL MEETING & ENGINEERING DISPLAY, Jan. 7-11, 1946, Book-Cadillac Hotel, Detroit

AERONAUTIC (Spring), April 3-5, 1946, New Yorker Hotel, New York

Baltimore – Oct. 11

Engineers Club; dinner 7:00 p. m. Automotive Transportation – Postwar – A. W. Herrington, Marmon-Herrington Co., Inc.

Chicago – Oct. 9

Knickerbocker Hotel; dinner 6:45 p. m. Technical session 8:00 p. m. Symposium – Truck, Bus and Rail Cars: Trucks – Fred B. Lautzenhiser, International Harvester Co.; Buses – Lawrence H. Smith, General American Aero Coach Co.; Rail Cars – Robert Aldag, Jr., Chicago Burlington and Quincy Railroad.

Cincinnati – Oct. 11

Alms Hotel; dinner 6:30 p. m. Test Procedure at Aberdeen Proving Ground – Major E. J. Boebinger.

Cleveland – Oct. 8

Cleveland Club; dinner 6:30 p. m. Experiences in Europe and the Investigation into Enemy Materiel – R. L. Weider, White Motor Co. Motion picture – Taken by A. J. Weatherhead, Jr., Weatherhead Co. Explanatory talk by George H. Hufferd, Weatherhead Co., will cover the movies.

Dayton – Oct. 23

Van Cleve Hotel, Dayton; dinner 6:45 p. m., meeting 8:00 p. m. Jet Engines. Speaker to be announced.

Detroit – Oct. 10 and 15

Oct. 10 – Horace H. Rackham Educational Memorial Bldg.; meeting 7:30 p. m. Afternoon Session: Non-Scheduled Airline Operations – Leighton Collins, Air Facts Magazine; Howard Ailor, National Fly Yourself System. Evening Session: Feeder Line Operations – James G. Ray, Southwestern Airlines; Bowman R. Otto, Auto Air Lines; M. Burleigh, Greyhound Lines; David Dort, Michigan Central Airlines.

Oct. 15 – Horace H. Rackham Educational Memorial Bldg.; dinner 6:30 p. m.; meeting 8:00 p. m. Die Castings – William O. Galloway, Jack & Heintz, Inc.; J. C. Fox, Doehler-Jarvis Co.

Indiana – Oct. 11

Antlers Hotel, Indianapolis; dinner 6:45 p. m. Induction Heating Applications to Auto Engineering – H. B. Osborn, Jr., Ohio Crankshaft Co.

Kansas City – Oct. 9

Continental Hotel; dinner 6:30 p. m. Automotive and Aircraft Electrical Systems – S. Floyd Stewart, Leece-Neville Co.

Metropolitan – Oct. 11

Hotel Pennsylvania, New York City; meeting 8:00 p. m. Aeronautical meeting. Subject: Air Power. Speaker to be announced.

Milwaukee – Oct. 5

Milwaukee Athletic Club, Milwaukee; dinner 6:30 p. m. Large Diesel Engine – Robert Cramer, Nordberg Mfg. Co. Slides and movies.

Northern California – Oct. 8

Engineers Club, San Francisco; dinner 6:15 p. m. Gas Turbines and 550-mph Aeroplanes already a Reality – John H. Bailor, General Electric Co.

Oregon – Oct. 12

Bonneville Dam, Ore. Inspection trip of Bonneville power generators and installations.

Peoria – Oct. 29

Jefferson Hotel; dinner 6:30 p. m. Gas Turbines, Jet Propulsion and Turbo-Chargers – J. I. Yellott, Bituminous Coal Research, Inc.

Southern California – Oct. 4, Oct. 26 and Nov. 1

Oct. 4 – Biltmore Hotel, Los Angeles; Aircraft Session – Symposium on High-Strength Aluminum Alloys: Shop Aspects of the New High-Strength Aluminum Alloys – Roy A. Miller and Max E. Tatman, Consolidated Vultee Aircraft Corp.; Utilization of New High-Strength Aluminum Alloys – J. F. McBrearty, Lockheed Aircraft Corp. Thirty minute question and answer forum conducted by M. E. Tatman, J. F. McBrearty, L. P. Spalding and H. M. Harrison. Air Transport Session – Symposium on Refueling: Operator's Viewpoint – Russell Secrest, Pan American Airways. Some Aspects of Under-Wing or Pressure Refueling – C. S. Brandt and W. C. Wold, Consolidated Vultee Aircraft Corp.; Fuel Refiner's Viewpoint – John Knight, Intava, Inc.; Equipment Manufacturer's Viewpoint – A. O. Payne, Ohio Pattern Works and Foundry Co. Aircraft Session – Symposium: Weight Reduction of Aircraft Braking Systems through the Use of Reverse Thrust Propellers; Test Run Data on a B-32 – Wendell Eldred, Consolidated Vultee Aircraft Corp.; Propellers – H. H. Warden, Curtiss-Wright Corp., Propeller Division; Wheel Brakes – H. H. Kerr, Hayes Industries, Inc. Discussion by E. K. Lasswell, ATSC, Wright Field. Aircraft Powerplant Session – Factors in Aeration and Deaeration of Engine Oils – W. L. Weeks, Wright Aeronautical Corp. S-S System of Lubrication for Aircraft Engines – Prof. P. H. Schweitzer, Pennsylvania State College, and L. P. Sharples, Sharples Corp. Aircraft Powerplant Session – Effect of Engine Exhaust Pressure on the Performance of Compressor-Engine-Turbine Units – Prof. C. F. Taylor, M.I.T. Aviation Gas Turbine Installation Problems – M. C. Benedict, Aviation Gas Turbine Division, Westinghouse Electric Corp. The Place of the Gas Turbine in Aviation – F. W. Godsey, Jr., Westinghouse Electric Corp.

Oct. 26 – Biltmore Hotel, Los Angeles, meeting 8:00 p. m. Transportation & Maintenance Meeting. Speakers and subjects to be announced.

Nov. 1 – Biltmore Hotel, Los Angeles; Aircraft and Air Transport Session – Icing Symposium: Airplane Icing – Capt. C. M. Christensen, United Air Lines; De-icing Developments – Alun Jones, National Advisory Committee for Aeronautics. Aircraft Powerplant Session – Factors Pertaining to the Installation of In-Line Air-Cooled Engines – T. Hammen, Jr. and W. H. Rowley, Ranger Aircraft Engines. An Electrical Model for the Investigation of Crankshaft Torsional Vibrations in an In-Line Engine – Hugh B. Stewart, Allison Division, General Motors Corp. Aircraft Session – Brake Symposium: Research and Development of Aircraft Accumulators – K. C. Monroe, Vickers, Inc.; Power Brake Valves – E. F. Loweke, Hayes Industries, Inc. Discussion by E. K. Lasswell, ATSC, Wright Field. Air Transport Session – Economics of Airline Fuel Utilization – W. V. Hanley and A. Hundere, California Research Corp. Control of Cruising Economy of Future Aircraft at Altitude – Representative of Wright Aeronautical Corp. Aircraft General Session – General Requirements for Helicopter Engines – C. T. Doman, Aircooled Motors Corp. Helicopter – Fred Landgraf, Landgraf Helicopter Co., Inc. Helicopter movie from Bell Aircraft Corp.

Washington – Oct. 11

Dodge Hotel; Postwar Designed Cars – Floyd F. Kishline, Nash-Kelvinator Corp.

Western Michigan – Oct. 18

Occidental Hotel, Muskegon; meeting 7:45 p. m. Silver Bearings – Eugene B. Etchells.

Wichita – Oct. 18

Broadview Hotel; dinner meeting; speaker and subject to be announced.

Mohawk-Hudson Group – Oct. 10

General Engineering Bldg., Union College, Schenectady; meeting 8:00 p. m. Experiences and Impressions in Investigating Engineering Achievements of the Axis Powers – Dr. C. F. Green, General Electric Co., Schenectady, N. Y. Kodachrome and other slides will be used to illustrate talk.

Spokane Group – Oct. 19

Dinner 7:00 p. m. Speakers and subjects to be announced.

Roger Mahey Named Head Of SAE Student Department

ROGER Mahey, for the last year assistant manager of SAE's Student Department, has been made manager of that department, John A. C. Warner, SAE secretary and general manager, has announced. Mr. Mahey will continue his activities as assistant manager of the Sections Department. In both capacities, Mr. Mahey operates as part of the Membership and Sections Division of the SAE Headquarters staff, headed by Hollister Moore.

Joint AISI-SAE Committee Ends Hardenability Work

WITH the publication of the second and final report on Hardenability Data the committee sponsored jointly by the SAE Iron and Steel Division and the American Iron and Steel Institute has concluded a two-year study of steels based on ranges of hardenability rather than on chemical composition.

Early in the fall of 1943 the Joint Committee sent a call to more than 200 users and producers of steel for their hardenability data based on the Jominy Hardenability test as set forth in the SAE Handbook.

The Joint Committee, made up of metallurgists representing principal producers and metallurgist members of the SAE War Engineering Board's Iron and Steel Committee, drew up a set of ground rules covering chemical composition ranges, quenching and normalizing temperatures, and so forth, for the steels to be tested.

Following an analysis of data received which covered many thousand heats of various steels, the committee issued its first progress report in May, 1944. The report included calculated hardenability bands for 68 carbon and alloy steels of standard compositions and hardenability data bands for 13 of those steels.

Last fall a new call was sent out for hardenability test data covering certain carbon steels. Data covering more than 2000 heats of these steels were analyzed and the final report containing data and bands on 14 heats of steel has just been published.

The committee in its final report had this to say about the work in general: "The first report served to disseminate information concerning ranges of hardenability to be expected in various steels purchased to standard limits of chemical composition. The report was instrumental in hastening adoption of tentative hardenability specification bands, and the data in the report assisted in establishment of those bands, which were made effective by means of the AISI-SAE publication 'Contributions to the Metallurgy of Steel No. 11 – Tentative Hardenability Bands' published in July 1944."

It is expected that the AISI will continue the work thus started by the Joint Committee on a greatly expanded basis, with SAE metallurgists representing the interest of the using industry, carrying on in a liaison and reviewing capacity.

Rambling Throug

MORE than 600 members and guests attended the summer **METROPOLITAN SECTION** smoker and showing of combat films July 26. A surprise feature of the evening was brief talks by Lt. Matthew Cantillon, U. S. Coast Guard, a beach master on nine Pacific Isle invasions, wearer of the Silver Star, two citation ribbons

Interested spectators of captured enemy equipment displayed at Met. Section meeting are Lt. Douglas K. Porteous, U. S. Navy (left), and Ted C. Ning, engineer, American Airlines, Inc.

from admirals and one from Gen. Douglas MacArthur, and Chief Gunners Mate Kenneth Humphrey, USN, another hero of the Pacific . . .

Two exhibits of captured Japanese aircraft instruments, machine guns, and other military equipment were shown, one through the courtesy of Lt. Douglas K. Porteous, U. S. Navy, and the other with the cooperation of American Airlines, Inc. were carefully examined by the engineers . . .

Chairman of the meeting was E. N. Hatch, the Section's vice-chairman for T & M, who was ably assisted in the planning by Vice-Chairman F. T. Kurt, Aeronautics; Richard Creter, Diesel Engineering, and Ed Foley, Air Transport; Treasurer Richard C. Long; Kenneth Kasschau and James K. Miller, House Committee; and Reception Committee Chairman D. F. Geisey. R. Dixon Speas, Metropolitan Section chairman, introduced Mr. Hatch . . .

Fourth annual "Little White Sulphur" summer meeting was held by **WESTERN MICHIGAN SECTION** Aug. 24 at beautiful Pioneer Park on Lake Michigan . . . Balmy weather beckoned all to enjoy baseball, horseshoes, egg toss, golf and other activities . . . Fun-making culminated in most strenuous and hilarious feature of the day – Lake Michigan perch fry served Muskegon style with no knives and forks in the rustic atmosphere of the log pavilion . . . Absence of eating equipment did not detract 80 members and guests from consuming 150 lb of fish . . . One serious note was introduced by Sgt. Louis Lorenz of the Second Armored Division, who related his experiences in the Army through training maneuvers in this country, the

Student Branch News

ENROLLED students of the General Motors Institute SAE Student Branch took a field trip to the General Motors Truck and Coach Division plant in Pontiac on July 11 for a field demonstration of U. S. Army "Ducks" which are manufactured at this plant.

Loaded in an amphibious "Duck," the group traveled on the highway at speeds ranging from 35 to 40 mph. The driver directed the vehicle off the highway and into a nearby lake, crossed the lake at a speed of 8 mph, and climbed the opposite shore.

Demonstrating versatility of the "Duck," the driver negotiated steep inclines and drove through underbrush and ditches before returning the group to the plant.

A second group of SAE enrolled students made a similar amphibious excursion on Aug. 8.

Harvey Freeman, chairman of the SAE Student Branch of M.I.T., also is serving as president of the Institute's Combined Professional Societies.

As the representative of the nine professional societies active on the M.I.T. campus, Mr. Freeman is a member of the Institute Committee, governing board of the Institute.

Section Reports

frican Campaign and the European War, through Normandy, France, to the hine . . .

Tractor and Power meeting of **SOUTHERN CALIFORNIA SECTION** June 7, hich attracted over 200 persons, took the form of a question and answer session, ith the audience's curiosity aroused over the talk on "Modern Industrial Engines nd Their Application" by E. R. Rutenber, installation engineer, Waukesha Motor o. . . . Garnishing his discussion with photos of compact engine-refrigeration and ngine-generator units for use in bombers, tanks, PT boats, and slides of various ld-time tractors showing yesterday's latest developments, Mr. Rutenber verbally ighlighted his paper with such remarks as: engine wear varies in different localities ue to different humidities . . . if an engine is of heavy construction, it is worth-hile to step up its power . . . use 8 to 1 compression ratio when the fuel is 100 ctane . . . chrome-plating the top piston ring surface is advisable . . . Preceding he meeting, two pictures were shown: "The Strength Unseen" and "Bent-for-Hell-uggy" . . .

Round and camp-type engines was the subject for the July 17 luncheon meeting eld by the **SAN DIEGO BRANCH** of Southern California Section, with K. L. errmann, consulting engineer, author of the discussion . . . Reviewing with lantern lides the developments of swash-plate, wobble-plate, and Z-crank engines, Mr. errmann concluded his talk with performance data and photographs of a cam ngine of his own design . . . Major advantages claimed by the speaker for his ngine over the conventional aircraft engine are: (1) reduced frontal area; (2) 0% reduction of moving parts; (3) inertia forces are balanced to zero at all times; 4) 40% reduction in weight of basic engine without accessories . . .

Jean Y. Ray

New addition to the Society's family is **SAE VIRGINIA GROUP,** welcomed into official status by the Council at its last meeting, and already boasting a potential membership of over 125 . . . Starting its career with a meeting at the William Byrd Hotel in Richmond Aug. 23, the Group includes territory in Southern Virginia, some of which was voluntarily ceded by the SAE Washington Section . . .

Jean Y. Ray, manager, motor vehicle department, Virginia Electric & Power Co., temporary chairman, presided at the first meeting, which featured such SAE luminaries as Merrill C. Horine, sales promotion man-ger, Mack Mfg. Corp.; W. J. Cumming, Office of Defense Transportation; William . Howard, Smith-Utterbach, Inc.; and SAE staff representative Henry Jennings . . .

Mr. Horine gave a detailed discussion of "Post-War Trucks," after which Messrs. umming and Jennings offered their views on the future prospects of transporta-ion and maintenance . . . Of special interest to those in attendance, as well as to he entire field, was a comprehensive program presented by Mr. Howard on apprentice training for the automotive industry – the preparation of which was aided by many SAE members . . . This schedule, directed primarily to the returning veteran, meets the requirements for qualification under the G. I. Bill of Rights, and covers every angle of instruction, from terms of apprenticeship, probationary period, supervision of apprentices, schedule of work processes, hours of work and wages, to the final certificate of completion of apprenticeship . . . Mr. Howard declared the purpose of these standards is to insure "future skilled craftsmen in the automotive industry throughout Virginia who will be equipped with knowledge of the trade" . . .

Aero Prop Shaft End Task Is Under Way

REDUCTION of the number of existing standards for propeller shaftings designed for aircraft engines of the low horsepower class and to establish ranges to govern the use of the remaining standards, is the assignment undertaken by the Committee E-15, Small Engine Propeller Shafts, of the SAE Aircraft Engine Subdivision.

At the first meeting held Sept. 10 and 11, in Buffalo, the committee went into immediate action by:

a. Recommending the elimination of the number "7½" Spline Shaft End because of its general lack of use by industry;

b. Recommending that the number "0" Taper Shaft End (AS126) and the numbers "10" and "20" spline Shaft Ends (AS41) be marked as "optional" and that the Flanged Shaft Ends (AS127) be marked as "preferred";

c. Recommending that the number "2" Flanged Shaft End (AS127) be marked "inactive for new design." The Committee will revise the Flanged Shaft Standard (AS127) to include dimensions for a new number "4" Flange size in order to cover the entire range with the preferred type of propeller shaft end, and

d. Agreeing that ranges should be established to govern the use of the various propeller shaft ends. This range, the committee agreed, will be determined by a factor to be obtained by multiplying the cylinder bore of the engine in inches by the mean propeller shaft torque in foot pounds at engine rating.

Based on the above formula, the following ranges were tentatively established:

For factors up to 1000 use the number "1" Flange;

For factors from 1000 to 1900 use the number "3" Flange, and

For factors from 1900 to 2700 use the number "4" Flange.

In explaining these tentative ranges, the committee cited the following example:

A 150 hp engine rated at 2500 rpm with a cylinder bore of 4.375 in. would have a mean torque times bore equal to a factor of 1378, and therefore should use a number "3" Flanged Propeller Shaft End.

Ranges will also be established for the number "0" taper shaft and the number "10" and "20" spline shaft ends.

All proposals by this committee will be thoroughly coordinated with the Civil Aeronautics Authority before final committee recommendations are made.

Committee Members

Members of this committee, serving under the chairmanship of Herb Rawdon, Beech Aircraft Corp., are J. P. Flannery, Aircooled Motors Corp.; Gordon L. Freedman, Freedman-Burnham Engineering Corp.; W. L. Greene, Engineering & Research Corp.; D. K. Griffin, Curtiss-Wright Propeller Division; R. V. Grimes, Hartzell Propeller Co.; P. F. Hackethal, Aeromatic Aircraft Propellers, Koppers Co.; R. P. Lambeck, Hamilton Standard Propellers; Lloyd H. Leonard, Aircraft Specialties Division, Zimmer-Thomson Corp.; P. B. Martin, Lycoming Division, The Aviation Corp.; J. J. Shields, Continental Aviation & Engineering Corp.; W. A. Wiseman, Warner Aircraft Corp.; Harold R. Uhrich, Sensenich Bros.; and R. C. Hoy, Piper Aircraft Corp.

CRC Directors Named

RE-APPOINTED for another two-year term as SAE directors on the Coordinating Research Council Board beginning Jan. 1, 1946, are J. M. Crawford, William Littlewood, Arthur Nutt and J. C. Zeder.

Representatives of the Society who still have one year to serve on the board are: B. B. Bachman, W. S. James, and C. G. A. Rosen.

Committee Personnel

COUNCIL has approved the appointments of the following committee personnel:

F. M. Washburn, superintendent of metallurgy and inspection, Wisconsin Steel Works, has been named to the Iron & Steel Division, succeeding B. F. Courtright, same company;

John Oswald, quality engineer, General Motors Corp., is now a member of the Passenger Car Body Division, at the request of Chairman E. C. DeSmet and Standards Committee Chairman J. H. Hunt;

James H. Wernig, assistant chief engineer, Fisher Body Division, GMC, has been appointed to the Passenger Car Body Activity Committee.

T & M

NEW Engines Fuels, Oils, and Bearings

by Trescott S. White

NEW ENGINES, new fuels, new lubricating oils, and new bearings were the subjects presented at the Northern California Section's all-day T & M meeting Sept. 7. Emphasis was on "what's ahead?" and "the effect of wartime developments." Judging from the papers presented we can expect considerable improvement in transportation equipment.

From the opening question, "What goes on here?" to the final rising vote of thanks to those participating in the program, chairman of the day, Northern California Section's Past-Chairman S. E. Onorato, Union Oil Co. of Calif., led an interested group of engineers through a morning session presided over by Technical Chairman Henry Pape, Purity Stores; a noon luncheon; an afternoon session presided over by Technical Chairman S. G. Culver, Key System; a dinner, and an evening session attended by 170 members and guests. All arrangements for this meeting were handled by Mr. Onorato, with help from House Committee Chairman Jack Bourne, Standard Oil Co. of Calif. and Reception Committee Chairman, Roy Hundley, Enterprise Engine & Foundry Co.

All engines of the future will have oil-cooled pistons, tapered rings in tapered lands, better connecting rod bearings, piston head design with heat dissipators in the crown, larger oil sump, no external piping or tubing around oil filters, better manifold design to eliminate hot spots and equalize fuel distribution, and a new and cooler location for the fuel pump, if E. B. Lien, Union Oil Co. of Calif., realizes his wishes. These predictions were contained in Mr. Lien's paper, "Heavy-Duty Motor Oils and Suggested Engine Design Changes," the first paper of the morning session.

Wide Use of Additives Seen

Before commenting on future engine design trends, Mr. Lien reviewed the history of and reasons for the development and use of additive-type lubricating oil, the tests to determine suitability of a given oil, and data on present day additive-type oils, adding that no doubt this type of oil would soon be in widespread use in automotive and diesel equipment.

Ring sticking, sludge formation, sticking valve stems, increased wear rates, and more severe bearing corrosion were the problems in heavy-duty engines which caused development of the first additive-type oils some 10 years ago, stated the speaker, adding that recent increase in engine speeds, temperatures, and loading conditions among all types of civilian equipment puts them into the heavy-duty class where they will be subject to the above troubles unless additive-type oils are used.

The wartime use of copper-lead bearings forced the development of "all-purpose oils" which do the work of the earlier additive-type oils and in addition are noncorrosive to whatever bearing material might be used, he said, pointing out that this development brought about an entirely different group of additives than were used 10 years ago.

Commenting more fully on the engine design changes he would like to see incorporated in engines of the future, the author said that oil-cooled pistons would reduce the amount of heat handled by the rings thus helping in ring-sticking problems, and in addition would provide a warm engine for door-to-door delivery engines thus preventing wet sludge formation.

Chrome plating the piston rings, together with tapered shape and fit would greatly extend ring life, give a better seal, and keep the ring space free from decomposition products likely to cause ring sticking, he continued.

Mr. Lien urged engine manufacturers to adopt bigger and better connecting rod bearings of a material more resistant to hot and cold corrosion, a change in piston head design to provide a machined-in ring or rings to act as heat dissipators, larger crankcases to hold two to four quarts more oil than at present in order to get more cooling, installation of adequate oil filter as built-in standard equipment eliminating all filter pipes and tube connections, better intake and exhaust manifold design to give more uniform and warmed fuel distribution, and the relocation of the fuel pump to a cooler spot where it would be less likely to cause vapor lock.

Fleet operators can protect their equipment by purchasing heavy-duty lubricants from reliable dealers only and by asking for assurance that the lubricant is suitable for the service intended, advised Mr. Lien.

Oil Drainage Discussed

As to the question "When should oil be drained?" Mr. Lien quoted the SAE T&M report "Engine Deposits – Prevention and Removal," which advised 1000 to 6000 miles depending upon type of maintenance, quality of oil, use of filters, and length of run. He added that, in his opinion, the 6000-mile figure is excessive and that the low cost of oil compared to cost of overhaul and cost

Post-War TRACTORS Will Be Improved By War Emergency

By Prof. L. A. Wilson

THAT greatly improved agricultural machinery will be available to the American farmer early in the postwar era as the result of experience gained in the building of war equipment was made evident in three excellent papers presented at the Milwaukee Section's Tractor Meeting held in the ballroom of the Schroeder Hotel on Sept. 13. Keen interest was manifested by the 300 members and guests who attended the session. The program had been arranged by the SAE Tractor and Farm Machinery Committee, headed by W. F. Strehlow, chief engineer, Tractor Division, Allis-Chalmers Mfg. Co.

Mr. Strehlow opened the session with a brief reference to the ODT requirements which had necessitated the substitution of a one-day local meeting in place of the traditional two-day SAE National Tractor Meeting. He then introduced C. O. Slemmons, B. F. Goodrich Co., who read a prepared paper on "Rubber Tracks for Agriculture." Mr. Slemmons said: "In the search for greater traction, designers have for many years sought to apply tracks to farm machinery because this form of mobile support can provide low ground pressure and high tractive ability." He stated that the development of the rubber band track had added outstanding performance and high mechanical efficiency to the desirable characteristics of a track suspension, and that experience gained during the war in the technique of designing rubber track suspensions pointed the way to attack the problems that must be solved in order to make the much sought after characteristics of track suspensions available to agriculture.

Mr. Slemmons then described in considerable detail the construction and wartime applications of three types of rubber track – band track, band block track, and flexible friction drive track. Of these he said: "All three types possess attractive features for agricultural applications. The size and duty of the tractor or machine determines the selection of the track type. The rubber track efficiency and performance characteristics are common to all three."

Prepared discussions of Mr. Slemmons' paper were read by A. B. Skromme of Firestone Tire & Rubber Co., E. F. Brunner of Goodyear Tire & Rubber Co., and L. C. Daniels of Oliver Corp. Mr. Skromme stated that a track is essentially a uniform road surface which is continuously being picked up and laid down as the vehicle moves forward or backward, and each wheel is a power transmission wheel. He summarized the advantages of rubber tracks versus steel tracks as follows: "Rubber causes no damage to hard-surfaced roads. It reduces weight. It eliminates track-pin wear and gives longer life. It reduces impact shocks from the ground. It can be operated at a higher practicable speed. It operates with less noise. It gives better riding qualities and less vibration. It often permits an increase in drawbar pull. It provides greater ease of mounting and installation. It does less damage to crops." As possible disadvantages of the rubber track, he mentioned lower drawbar pull on hard soils, possibility of damage by cutting, inferior cleaning on sticky soils, and less traction on ice. Mr. Daniels, in his discussion, stated that there is 38% less rub-

ber in tracks than in an equivalent set of rubber tires. He expressed the opinion that rubber tracks with bogie suspension can be produced for less money than the steel track job can.

B. G. Van Zee was introduced as chairman for the second half of the afternoon program. He, in turn, introduced F. F. Vaughn, Caterpillar Tractor Co., who read a paper on "Induction Hardening as Applied to Farm Machinery." Mr. Vaughn said: "The principle of heat treating by electrical induction is not new, yet it is only in recent years that the process has been used to any extent as a production method for various heat-treating operations. Rapid development in design has made available today, modern equipment with split-second controls so necessary in the successful use of the method in such operations. Equipment capable of such precise control is essential for repetitive results and uniformity in the heat-treated parts." He explained the principle of induction heating and stated that "physical contact between the part and the electrical circuits is not required; hence, if desired, the heating may be accomplished progressively by moving the part." With regard to penetration of the induced current he said: "With induction heating, most of the energy is changed to heat near the surface regions, and the higher the current frequency, the greater this tendency. This characteristic is known generally as *skin effect* and is one of important consideration relative to the depth of hardening desired, particularly in surface hardening treatment, with increasing current frequency, the penetration of induced current (and the layer which can be directly and quickly heated) becomes shallower. Because of the skin-effect characteristic, the method is ideal for surface hardening, hence the process and design of equipment has received greater emphasis in application to this type of heat treatment. For such practice, the process requires relatively high power input for a time sufficiently *short* to minimize heat travel

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of equipment out of service, would indicate a figure not to exceed 2000 miles for general use.

The fact that the sudden use of detergent-type oils in dirty engines softens previous deposits and causes plugging of oil screens, pumps, lines and filters, was pointed out by the author. He believes that commercial operators will watch this, but that the sudden use of these new oils by passenger car operators will present quite a problem. Of course, this problem does not exist in new engines, nor in an engine after once thoroughly cleaned, he added. Mr. Lien concluded his paper with the statement that at least one major automobile manufacturing company is recommending only heavy-duty oil for his postwar cars.

The use of insulating material around oil sump has greatly decreased sludge formation in door-to-door delivery operations, stated Charles Becker, Tidewater Associated Oil operations proved that oil can be kept warm enough to avoid condensation, he added.

Piston scuffing trouble might be eliminated by the use of an oil cooler, was the advice offered by another discusser.

Design features of the postwar truck engine were given a comprehensive review

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F&L Outlook Revealed, Turbine Explained

by T. D. MacGregor

SOUTHERN CALIFORNIA SECTION opened the current season of SAE meetings with an all day Local War Engineering Meeting on Aviation Fuels and Lubricants. Although the war emergency has now passed, the problems of aviation fuels and lubricants are still with us and must be solved by the concerted efforts of the aviation and oil industries.

The meeting consisted of three sessions, covering a total of five papers. Attendance at the sessions varied, the average being about 200 in spite of the industrial disruptions caused by the contract terminations incidental to the end of the war. Climaxing the meeting was a jet propulsion paper which drew an attendance of almost 400 which taxed the capacity of the Biltmore Hotel Music Room almost to its limit.

The session was opened by Gerthal French, section chairman, with a short talk on the need for the meeting, the work of the SAE during the war, and its plans for the present, during the transition period. He explained the work of the SAE placement service, whose activities in the West Coast War Industry Center have become of great importance. The technical chairman, C. C. Moore, then took over control of the meeting and handled the discussion after each paper.

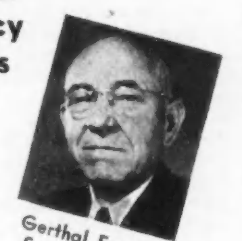
The members and guests present represented the major industries of Southern California – aviation, oil, and automotive, and the meeting is considered to have been of great benefit in having brought together for discussion of mutual problems, the various groups interested in fuels and lubricants.

Col. Homer A. Boushey, Jr., Commanding Officer, 412th Fighter Group, U.S.AAF, gave his paper extemporaneously with the aid of numerous slides. His talk developed the subject of jet propulsion from the most basic conception of the reaction method of propulsion to present propulsion units. His subject, in spite of the end of the war, was of a highly restricted nature. He did, however, explain the advantages and difficulties found with jet propulsion. The advantages were high altitude operation, high speed operation, simplicity and cheapness of the engines, versatility of the engines in respect to fuel (present jet units operate on kerosene), and the compactness which permits excellent streamlining of the vehicle. The disadvantages are few – the short range because of the excessive fuel consumption (two quarts in five seconds) and the extremely long take-off distances required.

The operation of jet-propelled aircraft differs from propeller-driven aircraft in that with jet propulsion the pilot has no "feel" on his controls until he has traveled a good distance on his take-off run. The power

Section Leaders in Local War Emergency Meetings

Trescott S. White
No. California



Gerthal French
So. California

L. L. Bower
Milwaukee

has to be kept up constantly for, if the engine is slowed down too far, the "fire" will be extinguished and the engine cannot be started again.

The colonel's charts gave the relative efficiencies of the various means of propulsion and showed that at altitude the efficiency of propeller-driven airplanes drops to quite a low figure. With present propeller-engine combinations, a speed ceiling of about 440 mph seems logical since the propellers are then operating at near the speed of sound and the adverse compressibility effects become very evident.

In the tactical operation of jet-propelled aircraft there are several interesting points. The fuel consumption at low altitude is so great that the engine must not be "idled" for any appreciable time. The jet units fortunately require no "warm-up" time. The pilots must make up their formations with a minimum of time since the fuel consumption does not permit long elaborate rendezvous maneuvers. Although jet airplanes because of their great speed cannot have as "tight" a radius of turn as propeller-driven units, the difference in speed permits both types to have approximately the same angular velocity with the result that the propeller-driven plane loses the advantage of its tight turn radius. The jet-propelled units have a much better climb characteristic. They climb at an angle very closely approaching the desired line of fire, thus simplifying the pilots' firing position. For night operation the jet units do not emit any glare or flame from the jet. Thus they are less visible than the conventional reciprocating engine.

Colonel Boushey's paper definitely left the impression that jet propulsion was very advantageous for high altitude, high speed flight but had not by any means replaced the conventional units entirely. It was also evident that while jet propulsion was now out of its infancy, it had a long road to travel for more general usage.

Despite rapid maintenance engineering developments during the war, aircraft lubrication is about in the same stage as the grease cup era of the automobile, in the opinion of D. H. Moreton, Douglas Aircraft Co., Inc., who presented a paper on "Problems Involved in Airframe Lubrication" at the morning session.

He described in detail the company's standard lubrication chart, a project begun in 1943 when it became necessary to simplify previous forms in view of the large number of planes of same model which were in operation throughout the world.

With more than 1000 ball and roller bearings, beside some 400 porous, sintered self-lubricating bushings, and scores of other mechanisms requiring lubrication, the large transport of today presents a complicated maintenance problem.

The author pointed out that magnificent cooperation between petroleum technologists and the aircraft manufacturers has frequently made the redesign of critical parts unnecessary.

But there is much work ahead, in view of the global range of peacetime airline operations. Three factors in selecting lubricants, beside the prime requirement for quality, were cited as:

Wide range as possible of each lubricant to limit the number required;

Global availability of lubricants, and

Cost and uniformity of lubricants.

Continued cooperation between interested groups was stressed in the discussion of Mr. Moreton's paper. In answer to a question, the author said that too little is yet known about the application of silicon compounds, although he ventured that they had interesting possibilities.

The most effective research on aviation engine oils will be in the development of better compounds for use in selected base oils, according to B. M. Berry and F. S. Rollins, California Research Corp. They pointed out in their paper, "Aviation Engine Lubricating Oil," that in the past it has been necessary for most of the emphasis to be placed on improvements in the mechanical features of aviation engines in order to provide better reliability of operation, longer overhaul periods, and lower operating costs. The quality of the lubricants used has also been important, but when the engine overhaul periods, for example, were limited by mechanical features, there was little advantage to be gained by the use of superior oils.

"Improvement in the mechanical features of aircraft engines has been so great that overhaul periods are no longer limited mechanically but by deposits and other factors controlled by the quality of the lubricant. It is therefore necessary that better oils be provided if full advantage of improved mechanical features is to be obtained.

"Some improvement can be accomplished by selection of crudes and refining processes," they pointed out, "but much greater improvement is possible by the use of chemical additives which enhance the properties of even the oils having the best natural characteristics."

During the discussion, the authors held that it was impossible to achieve the same detergency with compounded and uncompounded oils. Compounded oils will be the major factor in engine lubrication they predicted.

The morning session was presided over by Mr. Moore, who was also general chairman of the all-day meeting.

Again a plea for close cooperation between allied engineers on similar problems was voiced by A. G. Cattaneo, F. G. Bollo, and A. L. Stanly, Shell Development Co., who presented a paper on "A Petroleum Research Engineer's Outlook on Fuels for Conventionally-Powered and Gas-Turbine-Powered Aircraft."

The time has passed, they wrote, when a simple comparison of octane numbers would answer the question: "When is one fuel better than another?" The conventional aircraft engine of today also demands rich mixture performance, among other characteristics. Today's aircraft fuel may be compounded from as many as 20 different materials, but soon the petroleum technologist will have to make his choice from several thousand possible mixtures, they predicted.

In the gas turbine, the volatility of a fuel will have considerable influence on the formation of combustion chamber deposits since nonvaporized fuel tends to polymerize or to crack solid materials. The gas turbine can use heavier, or less volatile fuels than the conventional carburetor engine because the fuel can be atomized under pressure and is sprayed into an air stream already heated by compression. How heavy the fuel can be will again depend upon combustion chamber design.

In gas turbine engines also, economy means using the fuel with the highest possible Btu content. But whereas in propeller-driven airplanes weight is always at a premium and space for fuel is amply available in the wings, the very thin wing profiles for

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TRACTOR

cont. from preceding page

in the work by conduction. The ideal procedure requires sufficient power to confine the heating to just that depth to be hardened. Obviously to minimize heat travel by conduction, extremely short heating time is necessary. Such a heating cycle takes the affected zone to a high temperature, compared to conventional heat treating temperatures, so that diffusion is very rapid, yet time at temperature must be so short that excessive grain coarsening, which would ordinarily be expected to accompany such temperature, does not occur. In fact rapid heating produces better metallurgical structure in the hardened area and the core." With respect to full or through hardening, he said: "Recently, greater consideration has been given to adapting the induction heating method to the full, or through hardening type of heat treatment used for enhancement of overall physical properties. In contrast to surface hardening, which requires relatively high power input for a time sufficiently short to *minimize* heat travel in the work by conduction, this type of heat treatment requires a relatively lower power input for sufficient time to *allow* the heat to travel throughout the full cross-section of the material being heated. An important desirable feature of the induction method is the fact that heating can be accomplished without contacting the material being heated, thus heating may be progressive by moving the material through the inductor coil, and, in a protective atmosphere if desired." Advantages of the induction hardening process were summarized by Mr. Vaughn in the following words: "The small floor space required, adaptability of the equipment, and the uniformity and speed of operations, afford many advantages not obtainable with conventional equipment used for the heat treatment of a great variety of parts. In many instances the following costly and time-consuming operations usually associated with conventional methods of heat treating may be eliminated or greatly minimized: cleaning, distortion, straightening, decarburization, protection against carburizing, and material handling." The vital part played by split-second controls was again emphasized in his concluding statement: "The many applications and examples illustrated and described could not have been produced on a production basis were it not for the precise electrical and mechanical controls provided in the induction equipment available today for heat treating operations. However, these controls provide only a means of precise repetition of a cycle of heat treating operations which must be established on the basis of *proper metallurgical considerations*. It cannot be emphasized too strongly, that, anything less than this may easily prove disastrous in the end results."

Prepared discussions by H. Bornstein of Deere & Co., M. L. Frey of Allis-Chalmers Mfg. Co., and Mr. Kincaid of International Harvester Co., were in turn read. Mr. Bornstein stated that Deere & Co. have recently installed induction hardening equipment and feel that such equipment has a definite place in the production line. Mr. Frey revealed that electronic or tube-type sets are now available which operate at higher frequencies than motor-generator sets, the latter being

ited to 9600 cycles. "These new sets," said, "range in application from soft dering to very precise heat treatment of el, and are now available up to 100 kw d in the frequency range between 300 locycles and 15 megacycles." He further ted that *preheating* materially increases e depth of induction hardening. Mr. Kin- id, in his discussion, said that induction ating allows much more accurate control heat treatment, and is often more eco- mical, but that the initial cost of induction rdening equipment is greater than the cost equipment required for conventional ethods.

Following dinner in the evening, L. L. wer, Waukesha Motor Co., chairman of e SAE Milwaukee Section, introduced R. Twyman, Vickers, Inc., author of a per on "Hydraulics as Applied to Tractors d Farm Machinery." Mr. Twyman said his introductory remarks: "The farmer now confronted with a machine that has e potential to do so much in a day, and it so fast that he cannot physically keep ce with it on many of his jobs. Power erated controls for manipulation of farm plements, replacing the muscular efforts long depended upon, will help untold ousands of farmers to do their tractor ork in much less time and with much less tigue. These hydraulic power controls per- it the use of the tractor right up to the ak of its capacity – there is no slowing own because of human limitations." With spect to costs, he said: "Hydraulic devices r farm implements definitely can be rned out at a low cost, but only when ey can be standardized down to the mini- um number of types and when universal age will make possible industry-wide pro- ction quantities." Mr. Twyman then re- ewed the basic considerations of the mobile uipment problem and cited ways in which e problem is simplified by the application hydraulic power. He said: "Immediately, e note that the hydraulic system has no posed rotating belts, chains, gearing, afts, universal joints, bearings, splines, or utches. This simplifies our problem in any ways. Most space interferences are iminated, many lubrication problems be- me nonexistent, safety shields and guards come unnecessary, we cease to worry so uch about how to get our power around rners, and, not least in importance, we n provide for linear motions even more sily than for rotary motions." He then ve a very comprehensive, detailed analysis basic hydraulic circuits for mobile equip- ent, and component unit designs. With spect to application engineering problems, e said: "In proceeding to the general sub- ct of the application of the component draulic units to the tractors and imple- ents, we must once again take note of the ct that this problem of application engi- eering is the one where the most work mains to be done. If we can but get me reasonable degree of standardization, nd can suggest a reasonably wide variety fundamentally suitable farm implement ses, the problems of application engineering nd the problems of lowering hydraulic unit osts will be well defined." Mr. Twyman sualized the possibility of a farmer making ll use of the hydraulic power medium if e had at his disposal two separate sources "plug-in" power in the form of one large nd one small hydraulic pump mounted on is tractor. These "power generators" could e connected quickly to almost every ma-

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Mayo Hotel · Tulsa, Okla.

FUELS and LUBRICANTS

Meeting

November 6-7

TUESDAY, NOV. 6

MORNING

The Application of Heavy-Duty Additives to Aviation Oils
– C. O. Tongberg and R. E. Ellis, Standard Oil Development Co., and C. H. Baxley, Intava, Inc.

Prepared discussions by:
– H. L. Moir, Pure Oil Co.
E. A. Ryder, Pratt & Whitney Aircraft

AFTERNOON

Symposium: Field Performance of Detergent Type Oils

Some Performance Characteristics of Detergent Motor Oils versus Non-Detergent Motor Oils
– L. E. Calkins, Willys-Overland Motors, Inc.

DINNER

Review of SAE Activities in Fuels and Lubricants Field
– SAE President James M. Crawford and C. B. Veal, secretary and manager, Coordinating Research Council

WEDNESDAY, NOV. 7

MORNING

Performance Testing of Wheel-Bearing Lubricants
– E. W. Adams, Standard Oil Co. of Ind.

Prepared discussions by:
– W. G. Ainsley, Sinclair Refining Co.
Major N. W. Faust, Ordnance Department

The Application of Silicones to the Bearing Lubrication Problem
– T. A. Kauppi, Dow Corning Corp.

AFTERNOON

The Significance of Cetane Value of Fuels
– Lt.-Com. C. S. Goddin, USNR, Bureau of Ships, and Com. E. F. Griep, USN

Prepared discussions by:
– A. B. Culbertson, Shell Oil Co., Inc.
F. W. Kavanagh, California Research Corp.
C. M. Larson, Sinclair Refining Co.
C. G. A. Rosen, Caterpillar Tractor Co.
F. G. Shoemaker, Detroit Diesel Engine Division, GMC

Diesel Fuel Additives Create New Concepts
– C. M. Larson, Sinclair Refining Co.

DINNER

Jet Propulsion in Aviation
– Bensen Hamlin, Bell Aircraft Corp.

New Ford President

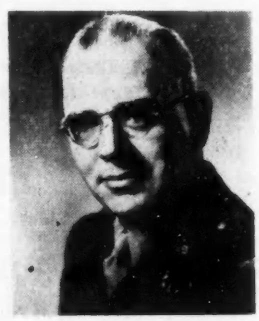
Henry Ford II, who succeeds his grandfather (right) as head of the huge Ford Motor Co. domain as president of the company. Henry Ford became the first vice-president of SAE the year the Society was organized in 1905. The new head of the company is a "third-generation" member of SAE

ADAM K. STRICKER, JR., has recently returned to General Motors Corp. after a leave of absence with the Signal Corps to assume the secretaryship of the Manufacturing Policy Committee of the corporation. While serving with the Signal Corps, Mr. Stricker was head industrial engineer, Distribution Division, U. S. Army, Office of Chief Signal Officer, Washington, D. C.

SAE Past-President **EDWARD WARNER** has been elected president of the Interim Council of the Provisional International Civil Aviation Organization. Formerly vice-chairman of the Civil Aeronautics Board, Mr. Warner was chief U. S. delegate to the world aviation board in August in Montreal. The Council was set up by the International Civil Aviation Conference, which met last fall in Chicago. The Department of State announced that Gerald B. Brophy, formerly alternate to Mr. Warner, had been appointed the U. S. delegate. Wishing Mr. Warner "happiness and continued success," President Truman accepted with regret Mr. Warner's resignation from CAB on Sept. 14.

Edward Warner

CARL E. CUMMINGS has been named to succeed the late **ALLAN V. RITCHIE** as superintendent of the Research Laboratory of the Texas Co. at Beacon, N. Y. At the time of his release from the Army, Colonel Cummings was serving as deputy chief petroleum supply officer for the European Theater of Operations. After graduating from Johns Hopkins University as a mechanical engineer, Colonel Cummings joined the



Carl E. Cummings

Texas Co. He became chief engineer at the Bayonne Laboratory in 1929, and two years later came to Beacon to do engineering work in connection with the laboratory's construction. He later became engineer in charge of the engineering research department and then supervisor in charge of that department, which position he held when granted a military leave of absence in 1941. Early this year, Colonel Cummings was decorated with the Legion of Merit for his part in supplying the Armed Forces in Europe with petroleum products.

Formerly chief engineer of the equipment and production processes department of the A. B. Chance Co., Centralia, Mo., **DONALD ZUERL** is now serving in the same capacity with the Danuser Machine Co., Fulton, Mo.

Formerly at the West Coast Sound School,

About

San Diego, Calif., **PAUL A. OVERBY,** an ensign in the USNR, may now be contacted c/o Fleet Post Office, San Francisco.

A. J. SCAIFE has been named chief of the mechanical section, research and development branch, Military Planning Division, Office of the Quartermaster General, Washington, D. C. Mr. Scaife was transferred from the Office of the Chief of Ordnance-Detroit, where he had been senior engineer, chief of the fording section, Development Division, Detroit. Mr. Scaife, a past-president of the Society, was elected a life member in 1935.

S. BERTRAND BARNARD, formerly chief engineer of the Naval Ordnance Division and later consulting engineer on postwar projects of the Industrial Division, American Type Founders, Inc., also consulting engineer with Aircraft Engineering Products Corp., has opened offices as a consulting engineer at 1841 Broadway, New York City. He will specialize in new product development, research, patent investigations and industrial surveys. A member of the New York Bar, he will act as consultant to attorneys on engineering and patent problems. He is associate editor of the Metropolitan Section *Accelerator*.

Formerly affiliated with C. K. Jones, Inc., Springfield, Mass., **GEORGE D. RICE** is now president and chief engineer of the Rice Engineering Corp., same city.

KENNETH J. KEMP, formerly assistant manager, bearing division, Holland Precision Parts Division, Bohn Aluminum & Brass Corp., Holland, Mich., is now superintendent of branches, Clawson & Bals, Inc., Chicago.

H. H. KELLY has resigned as director, division of materials and equipment, Office of Defense Transportation, to accept an appointment by the Provisional Organization for European Inland Transport as its Washington representative. The organization has been established mainly to assist in the rehabilitation of Western European transport and to help coordinate the efforts of military authorities and the various governments involved. Mr. Kelly has been with the ODT since its establishment in December, 1941. Prior to his association with ODT, his activities included service as the first automotive trade commissioner to Europe for the Department of Commerce.

H. H. Kelly

SAE Members

PAUL HEFTLER has retired from the position of powerplant engineer with Boeing Aircraft Co., Seattle, Wash. He will, however, continue to be interested in the spring suspensions with which he was working before the war.

RALPH E. GREY, JR., formerly a student member at Purdue University, West Lafayette, Ind., is now an aeronautical engineer with the National Advisory Committee for Aeronautics, Cleveland.

G. M. GOSSAGE, Aluminum Co. of Canada, Ltd., has been transferred from the Toronto to the Windsor, Ont., Canada, branch of the company.

CLYDE PATON has joined the Ford Motor Co. automotive engineering department as a consulting engineer. He will work directly out of the executive engineer's office, **R. H. McCARROLL,** executive engineer, announced early in September. Mr. Paton had been director of automotive engineering at Packard Motor Car Co.

Clyde Paton

NATHANIEL HAYNES is now affiliated with the Joshua Hendy Iron Works, Sunnyvale, Calif., as design engineer.

J. J. BROEZE, director of the Royal Dutch Shell Engine Laboratory at Delft, Holland, was the first member from the Netherlands to visit SAE Headquarters after the war. Mr. Broeze, a foreign member of the Society since 1938, is the author of several papers which have been presented before the SAE. He reported that SAE members in Holland got together for informal meetings regularly up until July of 1944 when lack of transportation made such gatherings an impossibility. While in this country Mr. Broeze may be reached through Dr. A. G. Cattaneo, Shell Development Co., Emeryville, Calif.

H. S. SHERWOOD has joined Service Analysts, Inc., New York City. He was formerly with Faber Laboratories, Inc., as field and service engineer.

CARL F. B. ROTH has been elected president of Aircooled Motors Corp., Syracuse, N. Y., to fill the vacancy created by the resignation of **LEWIS E. PIERSON, JR.,** former president and director. Mr. Roth will take office immediately and will assume also the duties and responsibilities of general managership.

ERNEST G. WHITNEY, former assistant executive engineer of the Cleveland laboratory of the NACA, has been appointed to the post of assistant chief engineer of the Ranger Aircraft Engines Division of Fairchild Engine & Airplane Corp. Mr. Whitney was associated with the NACA for nearly 18 years, joining the engine research section of the powerplant division at Langley Field in 1927 after receiving his degree of M.E. from Johns Hopkins University. He was appointed one of two engineers jointly responsible for the engineering design and construction of the Cleveland laboratory and upon its completion he became chief of the engine installation division. Later, he was named assistant executive engineer, the post he held when he left to join the Ranger organization.

N. F. VANDERLIPP, who had been general manager of the Buffalo Plant of Curtiss-Wright Corp. since October, 1944, becomes executive engineer for the Airplane Division. He will supervise all engineering operations in the Columbus, Ohio, Buffalo and Kenmore, N. Y., plants.

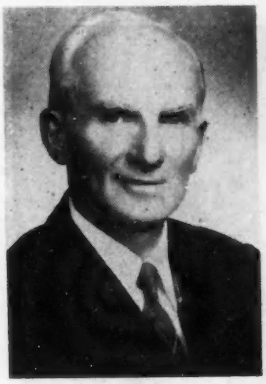
Walter A. Parrish, 1945 SAE vice-president representing the Diesel Engine Engineering Activity, has been named chief engineer of the Rogers Diesel & Aircraft Corp., New York City. Formerly executive engineer for the Superior Engine Division, National Supply Co., Springfield, Ohio, Mr. Parrish will, in his new position, take charge of the engineering, research, and development facilities of the parent company of the Rogers organization. In addition he will also aid in the formulation of engineering plans for its subsidiaries

JOHN K. RUDD, Wright Aeronautical Corp., Paterson, N. J., has been promoted from assistant project engineer to project engineer. Mr. Rudd continues to be in charge of development work on aircraft engine ignition systems used on Wright engines.

Charles W. Anklam

Charles W. Anklam has recently been appointed executive assistant to the president and chairman of the operating committee of the C. M. Hall Lamp Co., Detroit. In his new position Mr. Anklam will assume jurisdiction over plant operations, engineering, purchasing and distribution. Richard F. Eberline, former sales manager of the firm, has been named works manager. Mr. Eberline has been associated with the company for many years

Richard F. Eberline



A. R. Constantine

W. F. Oliver

Newly appointed vice-presidents of Bendix Home Appliances, Inc., South Bend, Ind., are A. R. Constantine (left), vice-president and director of engineering, and W. F. Oliver (right), vice-president and chief engineer. Mr. Constantine has served Bendix Home Appliances, Inc., as director of engineering since 1942, and Mr. Oliver has served as chief engineer since 1938

BERNARD J. MADOW has been appointed chief engineer of Shuler Co., Cleveland, Ohio. Mr. Madow was formerly project engineer with the Weatherhead Co., same city.

L. A. BONDON has opened an office and laboratory known as the Product Development Co. of Arlington, N. J., which will specialize in consulting and development work in the applications of rubber and plastic products and processes. Mr. Bondon formerly served as development engineer with Breeze Corporations, Inc., Newark, N. J.

N. L. ALISON has left his position as general manager of the Hydraulic Coupling Division, American Blower Corp., Detroit, and is retiring to his home in Phoenix, Ariz. Mr. Alison shortly will open an office in Phoenix as consulting engineer, specializing in fluid drives as applied to the automotive industry.

Formerly gear cutter, General Electric Co., Schenectady, N. Y., **GEORGE WILLIAM MEGRATH** is now the proprietor of Megrath's Garage, Reading, Vt.

ROBERT B. HAWKINS, Sealed Power Corp., has been transferred from the Rochester, N. Y., branch to the Detroit branch of the company.

CAPT. BENJAMIN ROZETT has been placed on inactive status with the Ordnance Department. During his three-year tour of duty, he designed and constructed special testing and service equipment for Ordnance operations. He was in charge of the Sixth Service Command Ordnance Inspection Team and was reclamation officer at the Service Command Fifth Echelon Operation. Captain Rozett has resumed commercial operations, and is now associated with Joseph Weidenhoff, Inc., of Chicago, in the capacity of territory supervisor.

Capt. Benjamin Rozett

Formerly production engineer, Smith, Hinchman & Grylls, Inc., Detroit, **IRVING L. ROSS** is now chief checker of tool design with Robbins Engineering Co., same city.

D. D. DUESENBERG is now associated with the Perfect Circle Co. of Hagerstown, Ind., in an engineering capacity in the manufacturers' department.

Ralph R. Teetor

RALPH R. TEETOR, SAE past-president and vice-president in charge of engineering, Perfect Circle Co., recently addressed 200 blind veterans of World War II at the Valley Forge General Hospital.

Blind himself since the age of five, Mr. Teetor told the service men that "nothing can stop you from enjoying a normal, happy life once you have made up your mind that is what you are going to have." Warning them that people will be doubtful about a blind veteran's ability to do a job, Mr. Teetor said: "You must convince them that not only can you do that job, but also that you can do it as well as anyone else." Continuing, he said in part:

"Choose the field for which you feel you are qualified. Work hard to learn as much as you can about it. When you feel you are ready, go to it.

"Remember, you are not handicapped so long as you can think logically. You will be handicapped only if you are slovenly in your thinking.

"It will take courage and hard work for you to become accustomed to your new way of life. But you will make it by holding your heads high and never allowing yourselves to falter."

Formerly development engineer, Adel Precision Products Corp., Burbank, Calif., **JOHN E. FRAZER** is now development engineer with Transcontinental & Western Air, Inc., Kansas City, Mo.

LEE KETCHUM, who had previously been associated with Transportation Service, Renton, Wash., is now connected with Robblees', Inc., Seattle.

ROBERT N. DOBBINS is now a lieutenant commander in the USNR and is a naval aviator stationed at the Naval Air Station at San Diego, Calif.

Formerly project engineer, Thompson Products, Inc., Cleveland, **WILLIAM J. BORCHARDT** is now affiliated with the Industrial Design Laboratory, Los Angeles, Calif.

RILEY L. McBEE, formerly a student member at Purdue University, is now a midshipman in the USNR and is stationed in the Third Naval District.

EVERETT A. COOPER, U. S. Navy, has been promoted from the rank of midshipman to ensign and has been transferred from the Midshipmen's School at Notre Dame, Ind., to a motor torpedo boat squadron and may be contacted c/o Fleet Post Office, San Francisco.

JAMES M. RICKETTS has been promoted from seaman second class to seaman first class and has been transferred from the Naval Air Technical Training Center, Norman, Okla., to an overseas naval base.

Formerly metallurgist, Reynolds Metals Co., Springfield, Mass., **LOUIS KRISTOFF** has been named chief metallurgist of Aluminum Heat Treating Co., Cleveland.

ARTHUR S. HAWKS completed his services with the Internal Combustion Engine Division of the Bureau of Ships on Sept. 30. He entered the Navy in April, 1941, as a contract engineer and served for the duration in an advisory and special consulting capacity in connection with the maintenance and design problems of diesel engines installed in Navy ships. Mr. Hawks has not announced his future intentions but for the present will maintain his home at Washington, D. C.

W. G. FREER, formerly in the Aircraft Division of Packard Motor Car Co. of Detroit, has severed his connection with that company.

WALTER TREFZ has recently joined the National Standard Parts Association to head a new engineering and operations department designed to give to wholesaler members of the NSPA a highly specialized type of advisory service in connection with their store and machine shop operation. Mr. Trefz had formerly been associated with Aluminum Industries Inc., Cincinnati.

Walter Trefz

SAE student members who have recently entered the Armed Forces and who are attending Midshipmen's Schools throughout the country include:

	Formerly at	Stationed at
JOHN W. HUGGINS	C. I. T.	University of Notre Dame
RICHARD B. MORRISON	University of Colorado	University of Notre Dame
WALTER L. MURPHY	C. I. T.	University of Notre Dame
GEORGE R. SERGEANT, JR.	Yale University	New York Midshipmen's School
JOHN STEFANOFF JR.	C. I. T.	Cornell University
DONALD G. SWIERS	Case School of Applied Science	Columbia University
NEIL S. TEUFEL	Purdue University	University of Notre Dame

DONALD E. LOWMAN, USNR, formerly lieutenant (jg), has been promoted to the rank of lieutenant. Lieutenant Lowman, who had previously been assistant engines officer, Material Division, Staff, Pacific Fleet, Fleet Post Office, San Francisco, has been transferred to the U. S. Navy Bureau of Aeronautics, Washington, D. C.

Formerly chief engineer, Chicago Tool & Engineering Co., Chicago, **JOSEPH T. LUNDQUIST** is now associated with the Lincoln Engineering Co. of Illinois. Mr. Lundquist is serving in the capacity of sales engineer on industrial and automotive lubrication equipment.

TRUMAN F. SCHRAG has been named chief engineer of the Farm Equipment Division of Graham-Paige Motors Corp., Warren, Ohio. Mr. Schrag was transferred from the Detroit branch of the firm where he had been assistant chief engineer.

Formerly chief production designer, de Havilland Aircraft of Canada, Ltd., Toronto, Ont., Canada, **C. D. LONG** is now senior Canadian representative with the British branch of the firm, Hatfield, Herts., England.

CHARLES E. BATSTONE, U. S. Army Air Forces, has been raised from lieutenant colonel to colonel and may now be contacted at Headquarters Squadron, 36th District Depot Group, c/o Postmaster, New York City. Colonel Batstone is a past-chairman of the SAE New England Section.

CHRISTIAN PRETZ has resigned his position as assistant to the vice-president of the Studebaker Corp., South Bend, Ind., after serving 32 years with the organization. He is leaving to accept a position as vice-president of the Durham Mfg. Co., same city.

ROY C. ALLAN, Bendix Aviation Corp., will resume direction of Stromberg automotive carburetor sales. He had, until recently, been "on loan" to the corporation's Zenith Carburetor Division in Detroit. Mr. Allan

Roy C. Allan

formerly headed the firm's Kansas City branch and established the company's British branch in London following World War I.

Formerly resident engineer at the Nash-Kelvinator Office, Pratt & Whitney Aircraft, East Hartford, Conn., **K. M. SILCOCK** is now serving in the same capacity in the Kenosha, Wis., offices of the Nash-Kelvinator Corp.

A. A. McCORMACK has left his wartime position with Packard Motor Car Co., Toledo, Ohio, to help organize a new company, McCormack & Rieske, of Dayton, Ohio. The new firm will specialize in the development of items for the refrigeration industry with special emphasis on mobile applications for railroads and buses.

J. BARRAJA-FRAUENFELDER, consulting engineer in the diesel section of the American Locomotive Co., Schenectady, N. Y., has recently returned from serving on temporary duty as a special technician on investigation work for the U. S. Navy.

J. Barraja-Frauenfelder

JOHN W. ANDERSON, president, the Anderson Co., Gary, Ind., presented an address entitled "Let's Be Fair about Trade," before the Northwest Automotive Wholesalers Association Annual Spring Conference on June 15 at the Curtis Hotel, Minneapolis, Minn.

C. K. TAYLOR has been appointed sales engineer at L.G.S. Spring Clutch Corp., Indianapolis, Ind. Mr. Taylor was formerly an engineer with Oldsmobile Division, General Motors Corp., Lansing, Mich.

G. HERBERT MILLER has resigned from the Distributive Trades Administration of the Wartime Prices & Trade Board, Toronto, Que., Canada, and will return to N. R. Miller & Co., Toronto.

M. A. TRISLER has been transferred to the Product Studies Group, Central Office Engineering, General Motors Corp., Detroit. For the past four years, Mr. Trisler has been project engineer at Allison Division in charge of carburetion and responsible for fuel and induction system installations in aircraft using the Allison engine. He also served on SAE Committee E-1, Fuel Metering Standardization, during the war period.

William C. Heath

Reporting on Nazi engineering methods, **WILLIAM C. HEATH,** recently returned from a technical survey of German war industry, says that "German engineers wasted huge quantities of time trying to develop 'Rube Goldberg' ideas on their drafting boards." Mr. Heath, chief engineer of the Solar Aircraft Co., San Diego, Calif., arrived at Kassel, Germany, about two weeks before V-E Day. The purpose of his trip, on which he represented the Technical Industrial Intelligence Committee of the Foreign Economic Administration, was to learn the war production secrets of the German engineers in the hope that they might later be used against Japan.

Mr. Heath believes that German technological progress in aviation has been exaggerated in this country. "From an engineering standpoint they were ahead of us on some details, but we were ahead of them on others. On the drafting boards, we were probably about equal. But in the quality of the actual aircraft, we were ahead of them," he states. "Our advantage lay in having access to raw materials they could not get."

Commenting on war production in Germany, Mr. Heath says: "Their inspection problem was terrific. They had to look at everything twice because they knew that the Russians, the French, and the Poles would sabotage them if they could."

One particularly high point in his trip was the week Mr. Heath spent with his son, Pfc. William Heath, Jr.

EDWARD B. GOODWIN has been appointed sales manager of the Furnace & Air Conditioning Division of the Perfection Stove Co., Inc., Cleveland. Mr. Goodwin had been associated with the Engine Heater Division

Edward B. Goodwin

of the company since the inception of the cold starting engine heater development project.

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T & M

cont. from p. 31

and analysis in the second part of the morning session, titled "Motor Vehicle Powerplants and Transmission Line Units." The paper was prepared by Robert Cass of the White Motor Co., and read by Ray D. Schmitt of that company.

Technological wartime developments present the opportunity to get a fresh view of truck engine requirements, said Mr. Schmitt, pointing out that postwar competition will require the development and use of the best possible type of truck unit to survive.

War developed processes and equipment in oil refining works against the diesel and in favor of the gasoline engine, the author said, pointing out that the fuels previously used for diesels now make good grade gasoline, and that the general increase in octane number of all gasoline fuels, plus development of higher powered gasoline engines in smaller space, puts this type of engine back in competition with the diesel powerplant.

He continued with the statement that postwar engines with higher compression ratios designed to use premium fuels could increase power output 25%. Solid injection of fuel and supercharging are other means which may increase the power of postwar gasoline engines, he added.

Mr. Schmitt expects the L-head to continue in favor, at least for compression ratios up to 8 to 1, because of an overall lower cost per pound and greater strength. While servicing is somewhat harder on the L-head engine, incorporation of recent metallurgical advances will reduce the need for overhaul.

While air cooling of engines should be reanalyzed in light of wartime experiences, it still appeared unsatisfactory to the author for general truck operation because of lack of economical means of controlling temperatures and decreased accessibility due to shrouding.

Bearings having twice the capacity of present materials are already available and no doubt will be used in postwar engines, according to Mr. Schmitt. Aluminum shows good promise as a bearing material if some way can be found to keep them tight when cold, he added, continuing with the comment that the war developed processes of plating bearings is the difference between 1000- and 100,000-mile bearing life. Bearings of the future will have steel backs, then 0.015 of copper-lead, then a final plating of 0.0005 of some covering material to produce a tri-metal type bearing, according to Mr. Schmitt.

Use of aluminum pistons, plated rings, 10 to 15 lb pressure on the water circulating system, are some of the expected trends, stated Mr. Schmitt, observing however that there is not much chance for immediate change to liners either wet or dry, nor the use of aluminum in the engine itself. The use of superchargers is expected to increase because of less weight per horsepower, improved thermal efficiency of the engine, less friction horsepower, and less radiator required, said Mr. Schmitt.

Automatic transmissions will be a "must" in bus operations, and some form of automatic transmission – either hydraulic, torque converter, or straight mechanical type – will be used for some truck operations. On over-the-road or long haul service, particularly on super-highways, the added cost of any special transmission may preclude its use, added the author.

Rear axle design is due for a battle between the present arrangement using improved metallurgy and hypoid gear type designs, according to Mr. Schmitt, adding that the governing factor in any truck development is and should be the cost-per-mile basis including overhaul and maintenance.

Improved Brakes Needed

Brake surfaces are long overdue for reanalysis stated Mr. Schmitt, in pointing out the need for much improved brakes to go with higher speeds and heavier loads on the highways of the future. While air brake systems are better established and more highly developed, Mr. Schmitt sees hydraulic braking as the challenger, with continuously operating pumps and accumulator tanks to eliminate the time lag not present in air brake systems.

Continuing cooperation between aircraft and oil industries is essential if present and postwar airplanes are to get the best possible fuel at any point in the world at best economy of production and transportation,

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stated F. G. Bollo, in presenting the afternoon session's first paper prepared jointly by himself, A. G. Cattaneo and A. L. Stanley all of Shell Development Co. According to these engineers, the question facing the oil industry is this – which of the hundreds of possible fuel components available shall be used in the present and postwar airplanes, and in what proportions? Since power, economy and reliability including safety, are the three performance qualities demanded from any fuel for any type of engine, it is obvious that constant contact and technical cooperation between the oil refineries and the aircraft engine men are required to determine fuel requirement, they pointed out.

To determine whether one fuel is better than another, the authors pointed out that it was no longer possible to rely on any one of the following factors: octane number, rich mixture performance, availability, low cost, safety, uniformity, etc., but to *combine* all of these features in determining the best possible fuel.

Proceeding with their analysis of fuel requirements, the authors pointed out that the power available from a given engine is limited by either the cooling capacity of the engine, or by detonation. In the majority of present day air-cooled engines, take-off power is limited by engine cooling, not by detonation limits; and that there is generally a 5 in. hg manifold pressure margin between actual power used and the point of incipient detonation. Detonation is therefore not a limiting factor in present day aircooled engines, and any engine failure in take-off is generally due to overheating or defective spark plug or other part.

Direct injection of water containing detonation suppressing agents, has the double advantage of providing enough extra cooling to allow much higher bmep's without mechanical injury to the piston, and in addition it also raises the point at which detonation begins, stated the authors, illustrating with diagrams the effect of detonation on piston rings and other parts.

Just what is the most economical fuel, the airplane operators ask. "Consider carefully the following for your particular operation," said the authors: "Fewest pounds per hr or highest Btu per lb, mixture ratio for low-octane fuels or a lean mixture requiring a high-octane fuel, solid injection versus manifold mixing to obtain most even fuel distribution particularly uniformity of tetraethyl lead, pounds of fuel per mile traveled involving selection of proper speed and altitude, high-power cruising for long flights, and so forth.

Reliability in a fuel means freedom from any undesirable effect on engine operation and the least possible hazard, continued the authors. Vapor lock, evaporation losses, ease of starting, freezing point, good manifold distribution and fire hazard are the specific items, but they all hinge on the basic quality i.e., fuel volatility – which Mr. Bollo proceeded to describe and illustrate. The mechanics and chemistry of burning, and igniting and exploding, were explained and illustrated, by comparing standard fuel with so called safety fuel. "Considering the picture as a whole, it is our opinion that safety fuels offer much added safety where it is most needed and increase the hazard only where it can be controlled" stated the authors.

Vapor Lock Plagues Aircraft

Altitude, and the presence of dissolved air makes vapor lock a major problem in aircraft, continued Mr. Bollo, illustrating another big advantage of safety fuel in this respect. He added, however, that the use of the heavier or safety type fuels will require individual fuel distribution to each cylinder. The authors pointed out the poor economy of using conventional fuel having high volatility and high evaporation loss when for a large ship 5000 lb of payload is sacrificed merely to provide easy starting and good manifold distribution during warm-up, take-off and climb.

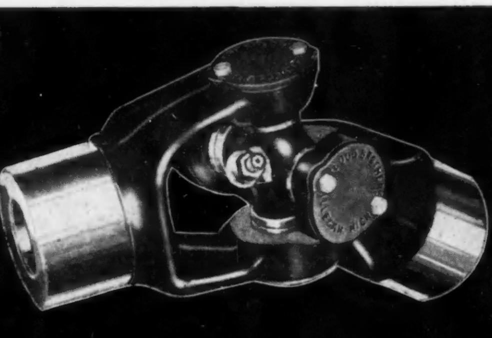
Fuel cost is so closely tied in with supply and demand of all petroleum uses (including other than aircraft) that no definite price can be predicted, but the authors added that it was certain that no aircraft fuel will be offered at a price lower than that which it can command in some other field, such as premium automotive fuel, for instance.

Engine detonation and octane number have no significance in gas turbine engines, Mr. Bollo said in commenting on fuel requirement for this type of engine. Maximum permissible turbine blade temperature, flame speed or speed of combustion, combustion chamber deposits, Btu content per cu ft not per lb (because of thin wings and extremely small storage space), are among the major factors affecting choice of fuel com-

ponents, continued the authors. Relatively heavy fuels are already in use in gas turbine engines, thus problems of vapor lock and altitude evaporation loss are thereby avoided, stated Mr. Bollo.

Messrs. Cattaneo, Bollo and Stanley concluded their paper with the statement that "fuel properties and engine design factors are interdependent, that fuel specifications should not be victimized to offset design mistakes, nor should a good design be jeopardized by bad fuel. Close cooperation will develop the best fuel."

"The use of fuels or gasolines ranging from the lower commercial grades up to 90 or 100 octane without the necessity of a change in compression ratios and at the same time produce a power curve with any given fuel, equal to or better than other engines of equal cubic inch displacement" is the outstanding feature of the new Fageol-Twin Coach engine, according to William Hubka, Twin Coach Co., who presented a paper "Fundamentals Behind Performance of Fageol Twin Coach Engine" prepared by L. J. Fageol, president of the company. This paper was the second one at the afternoon session. In addition to a patented combustion chamber the above performance is due to a combination of many well proved features of design, most of which are already in use by present day engine manufacturers, Mr. Hubka said.



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Cooling System Features

The cooling system of an engine, particularly its water circulating system, is possibly the most important thing affecting good design and engine performance, the author asserted, in describing the new Twin Coach engine. He listed important features of the cooling system as follows: extra-large sized water pump turning at one and one-half times crankshaft speed so as to give ample flow at idling speeds; use of long oil cooler which not only keeps water and oil within 15 F of each other, but distributes water evenly to the cylinders; use of not less than three to four lb pressure on all parts of the water system to help prevent steam-pockets; free and unobstructed water passages for full length of cylinder bores giving thermocouple readings within 3 F for various points along the liner compared to as much as 50 F temperature variation or hot-spots in the average commercial engine of today; even flow of water from block to cylinder head; removal of water from head from two points; use of jacket water to heat the intake manifold, and the use of extremely short exhaust port so as not to load up circulating water with this heat.

Reduction of friction losses, was the next phase in the development of the engine, according to Mr. Hubka, as he discussed: bearing alignment and fitting particularly as affected by engine distortion and as benefited by uniform temperatures due to uniform cooling water flow; lack of distortion leaves the pistons and sleeves perfectly round thus offering less friction loss; uniformity of wall thickness of cylinder block and base casting which helps maintain main bearing alignment thus reducing friction losses; extremely rigid and thick crankshaft to withstand a top speed of 4000 rpm and counterweighted to a greater extent than most engines, thus giving less distortion and drag on main bearings; roller chain drive for camshaft and accessory drive for oil pump and water pump give an efficiency equal to or better than most spur or bevel gear drives, and the use of align bored camshaft bearings flooded in oil and the use of rollers in valve rockers reduce friction loss in camshaft valve gear train.

Special design of the combustion chamber, illustrated by cross sectional drawings of the engine, permits the use of unusually high compression ratios without detonation, affords better volumetric efficiency than other engines, and controls combustion by proper location of spark plug.

In response to questions, Mr. Hubka added the following information: The engine produces 162 hp at 2600 rpm but is rated 150 hp after driving all accessories; displacement is 404 cu in., compression ratio is 7.4 to 1, thermostat is set at 180 F water to the engine; fuel pump is completely sealed and the electric motor and centrifugal pump unit are submerged in the gasoline tank; cylinder sleeves are of cast iron, dry, 0.002 loose when cold; the top piston ring is of special design to scrape away any carbon that might form. Following up the suggestions made by Mr. Lien in his paper at the morning session, Mr. Hubka pointed out that each of the items has been incorporated in the new Twin Coach engine.

Questions concerning the oil cooler and filter arrangements were answered by C. A. Winslow, Winslow Engineering Co., who

said the oil cooler contains 72 ft of ⅜-in. copper tubing selected to give plenty of cooling area without danger of plugging up. The filter is of the full flow type, with no external lines or connections, the author added, explaining in detail the concept of full flow and bypass types of filtering.

The best bearing material has not yet been found, but the war emergency forced the use of the development of many new bearing materials which surpassed expectations, stated R. A. Watson, Federal Mogul Corp., in his evening session paper "Bearings of the Future."

Even before metal shortages restricted the use of tin and cadmium, bearing manufacturers had had experience with high lead bearings in some services, said Mr. Watson, pointing out, however, that even though the government ordered their general use in place of tin babbitt, considerable study was necessary before new type bearings could be used for any and all applications. Loading, oiling, speed, and crankshaft hardness were some of the factors which had to be considered in determining suitability of the high lead bearings, he continued.

Avoidance of use of critical materials, immensely expanding production, greater precision of finished parts, plus a desire to develop a better bearing, were the objectives of the research and development departments of bearing manufacturers, according to Mr. Watson. He pointed out further that a great amount of research is needed to determine characteristics of a bearing material, and that one of the handicaps is that no one really knows what makes a bearing satisfactory and what causes a bearing material to be unsuitable. A universal alloy is nonexistent and an alloy ideal for one application is not always suitable for different operating conditions, he added.

One theory of what constitutes a good bearing alloy is that hard metallic grains are held in suspension by a field or matrix of softer material, said the author, illustrating this statement by photographs of tin base babbitt, and a high lead babbitt.

A second theory of bearing suitability holds that only certain elements are satisfactory in bearing alloys, Mr. Watson said, presenting Mendeleeff's Periodic Arrangement Chart where it could be seen that the materials that have been used as major ingredients in bearings, all fall in the *odd* series of this listing, specifically the 3rd, 5th, 7th and 11th columns. Mr. Watson would neither agree nor disagree with this theory.

The third theory of what a bearing should be contradicts the first theory to a certain extent by using a hard matrix and a soft filler, said Mr. Watson, showing a photo of a typical copper-lead bearing.

Mr. Watson summarized the requirements of a bearing as follows: Starting friction, mechanical misalignments of shaft and hole, dirt, capable of being formed into a bearing by bonding to steel or bronze, strong enough to stand the physical load, plastic flow tendencies so as to conform to shaft contour, embeddability or ability to absorb small particles of foreign material, resistance to corrosion, high melting point or not lose strength with reasonable increase in temperature.

Three war developed high lead bearing materials each suitable as a substitute for tin base babbitt in at least one set of operating conditions have been quite successful, and will no doubt be continued, Mr. Watson said.

Copper-Lead Bearings

Copper-lead bearings and the development of powder metallurgy has opened new fields of bearing design as well as new techniques of high production, according to the author, adding that the advantages of powder metallurgy are (1) better and more thorough distribution of the copper in the lead; (2) uniform control of the percentages of the ingredients, and (3) control of the hardness of the material. This bearing material has been used in most medium and heavy tank engines, Mr. Watson stated.

Coating a copper-lead bearing with a 0.0005 to 0.0015 layer of lead is a recent development which now makes this type of bearing suitable for soft shafts, advised Mr. Watson, pointing out that previously these bearings were limited to shafts of 300 Brinell or over.

Silver bearings on steel backs have made our aircraft successful, said the author, in presenting this type of bearing. He continued with the statements that silver has the good qualities of heat conductivity, fatigue resistance, resiliency and seizure resistance, and the ability to hold its mechanical strength up to high temperatures; and the adverse qualities of a high coefficient of expansion, poor oiliness characteristics

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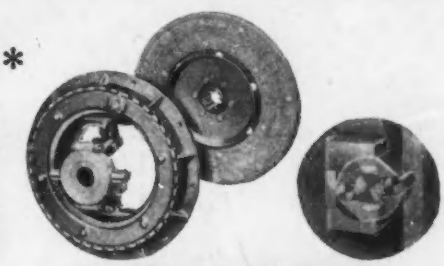

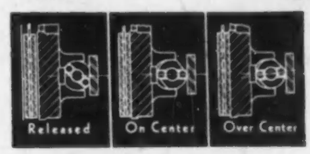

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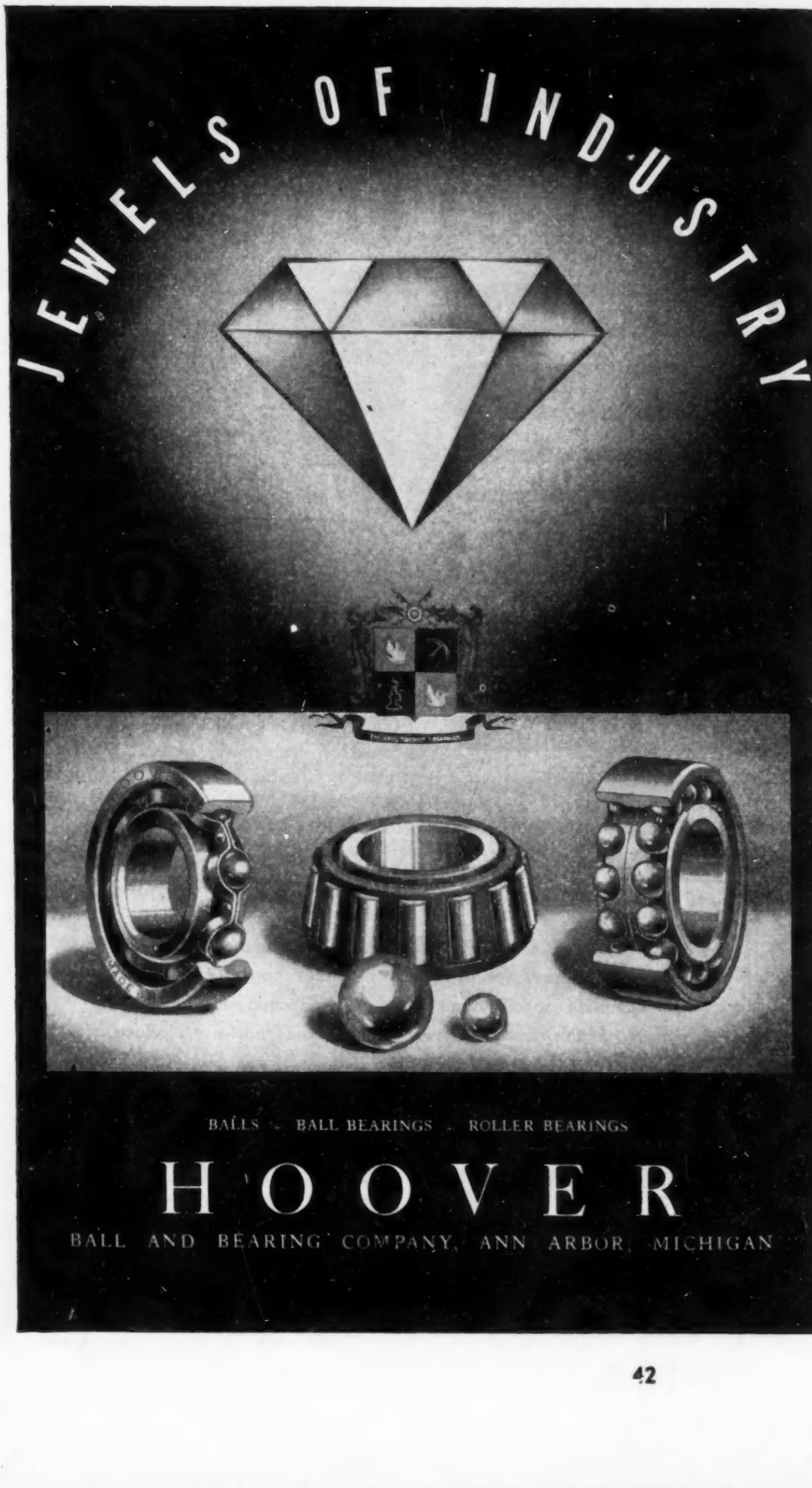
and no appreciable embeddability. The disadvantages are overcome by applying a coating of lead to provide oiliness and a flow from high spots set up by expansion, followed by a coating of indium to prevent corrosion, he continued. Mr. Watson did not expect to see silver bearings much used commercially because of their quite high cost, the degree of accuracy of adjacent parts, the shaft hardness of over 600 Brinell, lack of embeddability, and the requirements of absolutely clean oil at all times, all of the above coupled with best possible maintenance and operating attention.

Aluminum with 7% tin has now been developed as a satisfactory bearing material, according to Mr. Watson, pointing out that no backing is necessary but that bearing thickness must be rather substantial, and that the material must be chilled cast then heat treated to obtain proper structure. The requirement that shaft hardness be 300 Brinell or over, and the high coefficient of expansion are the disadvantages of aluminum bearings; however, my prediction is that aluminum bearings will be the bearings of the future, said Mr. Watson.

Mr. Watson included views of some interesting special type bearings, one of which he claimed had been made only once. He concluded his talk with the presentation of two charts showing the bearing materials now in successful use, and their fields of application.

A color film with sound took the audience on a personally conducted tour of the Hall-Scott Motor Car Co. plant at Berkeley, Calif., and showed the manufacture, assembly and test of the various types and models of engines produced by this company for wartime as well as peacetime use.

The picture included action shots of Hall-Scott power boats and vehicles in operation, and was preceded by an interesting talk by J. E. Glidewell, Hall-Scott Motor Car Co., on the history of the company and its products.



F & L

cont. from p. 32

high speed jet-propelled planes offer no space for fuel, and the premium may shift from weight to space. In that case the fuel should have a high Btu content per gallon, rather than per pound.

Fuel cost may constitute 10% or more of the total expense of an airline, and will therefore influence the direction of future developments. Unfortunately a price cannot be determined for any one product before the supply and demand position is known, and in addition the market price for every other oil product made from the same barrel of crude. Price predictions are therefore as uncertain as predictions on the number of airplanes, or on the type of engines they will use.

Under normal conditions no fuel will be offered at a price lower than that which it can command in some other field. Conventional aviation gasolines boiling in the 100-300 F range could make outstanding motor car fuel, and will therefore cost more than normal motor fuels. Fuels boiling in the 350-700 F range make premium diesel fuels or excellent cracking stocks for eventual use in premium motor fuels, they explained.

If the gas-turbine engine can be developed to use any commercial fuel in the gasoline, kerosene or diesel fuel range, it will be economically sound to look for the range that is least attractive for other uses. That will probably be the 300-400 F range which, generally speaking, makes poor quality gasoline and is not very attractive for cracking purposes. However, technological advances and the probable postwar changes in the relative demand for the various types of fuels make long-term predictions here also uncertain.

"In any case, it is well to realize that restrictions with respect to fuel composition or properties usually carry with them a penalty in cost. It pays therefore to keep in mind that fuel properties and engine design factors are interdependent – what one cannot economically achieve the other frequently can. Thus fuel specifications should not be victimized to offset design mistakes, nor, of course, should a good design be jeopardized by bad fuel. With close cooperation of the oil and aircraft industries it will be possible to develop the best combination of both," they concluded.

In discussion, the audience was told by one of the authors that turbine fuel specifica-

tions will be more rigid in the future than now.

Chairman A. G. Marshall then introduced the subject of "Water Injection of Aircraft Engines," by M. R. Rowe and George Ladd, Wright Aeronautical Corp., who covered water-alcohol mixtures as well. Experience has showed that a 50% solution of methanol by volume is the optimum mixture.

The authors pointed out that progress in the past few years, brought about by understanding the variables involved in water injection application has been noticeable in the aircraft industry.

The use of water injection as a detonation limiting medium, has made remarkable increases in engine power ratings possible, they reported. Operation at these high powers is critical and consequently close control must be maintained of the many variables involved. In line with the latest requirements, water injection systems are being developed which give automatic water injection with selective power operation over the complete high power range of engine operation.

"The part played by water injection in military aircraft applications has been established and undoubtedly development will be continued. It is visualized that commercial operators will analyze the presented information with the purpose of directing it into their plan of operations. Their participation will be dependent on postwar aspects," they concluded.

Compression cannot be boosted to take advantage of detonation, it was disclosed in discussion. The authors also believed that the advantages of water or water-alcohol injection shows up for short periods at high engine output, but is not noticeable in long flights.

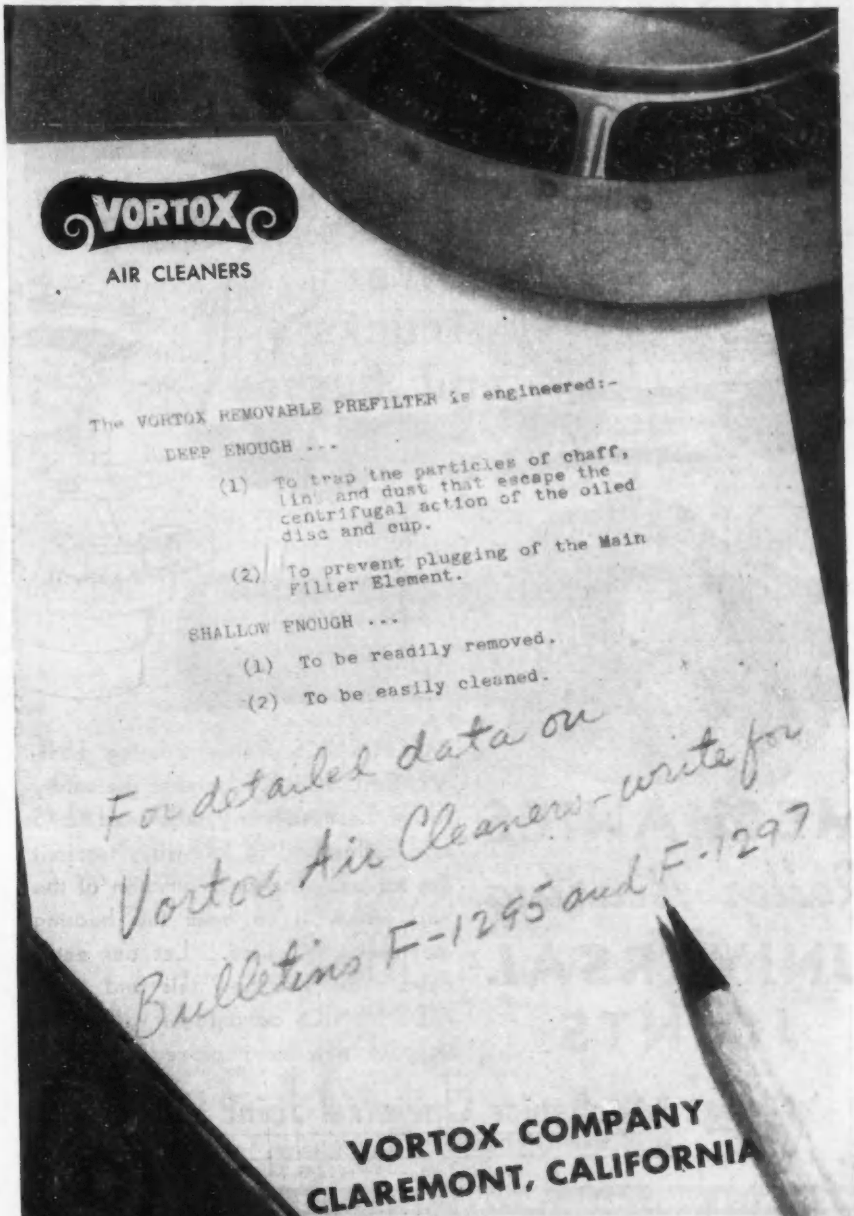
Mimeographed copies of all papers presented at the Los Angeles Aviation Fuels & Lubricants Meeting, Aug. 24, except that of Col. H. A. Boushey, Jr., are available from the SAE Special Publications Department, 29 West 39th Street, New York 18, N. Y., at 25¢ per copy to SAE Members and 50¢ to Non-Members, post-paid.

TRACTOR

cont. from p. 33

chine on the farm that requires considerable power to drive it upon intermittent occasions, particularly the plow, mower, baler, combine, post-hole digger, wood saw, and feed mill. He said: "There are any number of development possibilities that might arise from the inherent flexibility of the hydraulic method of power transmission and control, as applied to farm machinery. Certainly this should apply to mounted implements, drawn implements, or any other type of power driven farm machinery that may logically use the tractor engine as a source of power. The tractor, as a unit in itself, has been developed to a high state of usability. Implements, in great variety, have also been developed to a high degree. However, the manipulation of the tractor and the implement, so that they effectively act as a coordinated unit, has been a burden borne chiefly by the muscles of the farmer. Power hydraulic controls seem to offer many possibilities to the designing engineer in providing a practical means of tying the tractor and the mounted or drawn implement together so that they function essentially as a single unit, making it possible to work both tractor and implement to the maximum of their productive capacities. We know that we must make costs as low as possible, and make applications as universal as possible, in order that the farmer may economically justify the operating advantages. Standardization of any linking element between the tractor and the implement also gives obvious industry-wide advantages."

E. S. Witchger, Eaton Mfg. Co., in discussing Mr. Twyman's paper, mentioned increased use of hydraulic applications on mobile equipment in recent years. He said: "Tanks built before Pearl Harbor employed two pumps. Tanks developed last year employ fourteen. Cars a few years ago had one lubricating pump. In 1942 some used five pumps. Looking ahead we can visualize many more applications, such as windshield wipers, devices for raising and lowering tops, for raising and lowering windows, operation of power jacks, and others, totaling 16. Hydraulic power is practical and inexpensive enough to pay its own way." He advocated hydraulic steering of tractor wheels and pointed out that the use of hydraulic power transmission makes it no longer true that "a team of horses can out-



pull a tractor because of the inherent characteristics of the internal combustion engine."

The annual SAE Milwaukee Section "Golf Party" was held on the following day at the Merrill Hills Country Club near Waukesha. In spite of rain and overcast skies throughout the day, approximately 100 went out for a round of golf. The complimentary dinner in the evening brought out a capacity crowd of 200 members and guests. Owing to the generous cooperation of many individuals and industrial organizations, a great number of prizes were awarded to those whose names were drawn from a container.

Military Vehicles Rated High in ETO

continued from page 24

Digest of paper

by LT.-COL. E. H. HOLTZKEMPER
Office of the Chief of Ordnance – Detroit

▪ Detroit, June 4

(Paper entitled "Observations on Military Transport Vehicle Operation in Europe")

SUPREMACY of military transport vehicles belongs to the U. S. Armed Forces and her allies. This claim, made by Lt.-Col. E. H. Holtzkemper, Ordnance Department, after observing vehicle operation in the North African and European Theaters of Operation during 1944, was an overall judgment of trucks, trailers, semi-trailers, motorcycles and passenger cars which rated high in performance and durability – but which also had glaring defects calling for correction.

Comparing the method of operation of general purpose vehicles by the quartermaster truck organizations to that of combat and service organizations the colonel favored the type practiced by the latter group. Although vehicles assigned to all the organizations were overloaded and in need of maintenance, drivers in combat and service forces were more resourceful than those in the Quartermaster outfits, the speaker declared.

He observed further that supply organization vehicles operated over fair roads, the major portion of which were of black top construction in both the NATO and ETO. When operating on hard-surfaced roads, he found drivers to be conscientious in the application of front-wheel drive disengagement.

Supplementing his own observations with the first-hand experience of the men in all arms and services Col. Holtzkemper noted dissatisfaction with the large number of different sizes, makes and models of transport vehicles. He viewed it as the number one peacetime problem on transport vehicles which can only be solved by the automotive industry and the War Department working together cooperatively.

No complaints were registered by any of the personnel interviewed relative to coolant boiling except in cases where the coolant was low. However, the colonel heard many reports of driver fatigue, which he feels could be reduced if more attention were concentrated on designing the components in the cab for comfort and ease of control.

"Although the open-type cab is considered very satisfactory by drivers for use during warm weather and with side curtains during occasional summer rains . . . the ideal cab," he asserted, "would be of the closed type designed so the top and sides could be removed and disassembled into a compact unit. This cab could be used as a closed cab in cold climates and as an open cab with canvas top in warm climates."

Ordnance personnel, he discovered, preferred the steel body to the wood body, because the former has the advantage of being hammered back into shape in case of a wreck, or if it is torn, it can be quickly welded together again.

Analyzing the stability of accessories in combat, Col. Holtzkemper commented on the inability of brakes to operate for any duration in mud. He related that during the winter of 1943-1944, truck brake lining and brake drums would become worn and scored sufficiently to become inoperative after as little as 500 miles of combination road and cross-country travel. Ordnance maintenance personnel reported that some of the drum scoring after this operation was as much as 0.090 in. in depth and that at one time 90% of the Quartermaster Truck Company vehicles were operating without brakes. Brake drums and linings were flown to this theater to relieve the subject condition.

The colonel saw winches being very satis-

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factorily used in dumps and company areas for moving vehicles which had become mired in the mud.

Sometimes, when a vehicle had to travel through excessively muddy terrain, and chains couldn't do the trick, drivers would use a standard traction device weighing 1150 lb for a $2\frac{1}{2}$-ton truck, 6x6, and proportionally heavier for larger vehicles. The extreme weight of the device discouraged constant use, however, and the colonel suggests development of a traction device with as good tractive ability and life as the present one, but one that is lighter in weight.

Chains are not generally used on vehicles which operate a large portion of the time on roads and a small portion of the time in dump or company areas. Drivers told the colonel they would rather take a chance on getting through and of being pulled out by a tractor or winch or another truck if they became stuck rather than crawl down in the mud and install them for a few minutes of operation. However, they admitted that vehicles which are operating a large portion of the time or continuously off the road do have chains installed and consider them essential.

Ability to operate military vehicles in forward areas in the daytime and in forward and rear areas at night with the maximum protection from enemy observation was also regarded as important.

Concerning present methods of boxing and packaging vehicles and components, Col. Holtzkemper rated them as definitely superior to earlier methods, and they are considered very satisfactory to Ordnance field personnel. The only parts on which any large number of breakage complaints were registered were batteries and windshield glass. However, packaging methods on these two items have recently been changed, and it is believed breakage has now been reduced to a negligible figure.

The colonel enthusiastically credited automotive engineers who contributed materially to production, and who field serviced these vehicles and assisted in the training of military personnel to operate and maintain them.

Contact with Field Solves Aircraft Service Problems

Digest of paper

by

DAVID RODRIGUEZ

Consolidated Vultee Aircraft Corp.

■ San Diego, June 19

(*Paper entitled "Wartime Service Problems – Their Solution"*)

COMMENTING upon wartime aircraft service problems, David L. Rodriguez, Consolidated Vultee Aircraft Corp., noted that the wartime maintenance of aircraft in the field, coupled with unprecedented volumes of production, has brought to the attention of the aircraft manufacturer the need of maintaining a link between himself and the operators of his product. The manufacturer's problem, he declared, was to "follow his product into every part of the world and supply 24 hr a day technical assistance."

The speaker saw the problem as having resolved itself into four general phases:

1. An acute shortage of technical help forced the manufacturer to select men from production ranks. The personnel were selected upon the basis of experience, education, personality, and reliability, and were given an intensified course of training to fit them for their special assignment.

2. The manufacturer had to supply his customers and service representatives in the field with the latest, clearest, and most concise information on his products.

3. The manufacturer had to analyze, evaluate, and incorporate in his designs the latest service information obtained from the service representatives and operators of his product.

4. The manufacturer had to furnish parts so that service changes could be accomplished in the field.

An idea of the magnitude of the manufacturer's job in maintaining wartime service to his aircraft was illustrated by the following example:

"The service department of Consolidated Vultee, San Diego Division alone, in one month of last year, mailed out 88,176 pieces of technical literature, the greater percentage of which was prepared within the department; . . . shipped 9788 kits of parts for modification of its airplanes in service; and . . . received from the field 6272 individual reports."

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APPLICATIONS Received

The applications for membership received between August 10, 1945, and Sept. 10, 1945, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Baltimore Section: Archibald Craig, Lt. John R. Cunningham, Lt. Charles Francis Kolankiewicz.

Canadian Section: William A. Connor.

Chicago Section. Irvin L. Alspaugh, C. J. Bredemann, Herman Owen DeBoer, George F. Gates, Jr., Robert D. McIntosh, Robert W. Moore, William Paul Youngclaus, Jr., Walter R. Zaleski.

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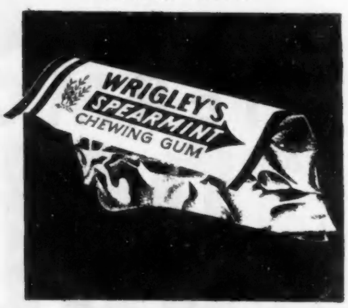
Peacetime production for industry, forecasts the return of Wrigley's Spearmint Gum—that favorite "help on the job," for workers everywhere. But Wrigley's Spearmint will be back only when conditions permit its manufacture in quality and quantity to meet your needs. Until that day, we ask you to remember the famous Wrigley's Spearmint Wrapper shown at right, as your guarantee of the finest chewing gum that can be made.

You can get complete information from O'Neil-Irwin Manufacturing Co., Minneapolis 15, Minn.

Typical Shapes Formed by the DI-ACRO Bender



Remember this wrapper

Z-86

Cincinnati Section: Ralph Floyd Anderson, Harold B. Frye, G. M. Harper, Jr., Douglass McCallum, Clifford Walter Packer, Calvin W. Stocks.

Cleveland Section: Irving Bradley, George W. Daggett, Russell L. Dobrin, Ernest H. Johnson, Earl J. Senne, Solomon M. Sorin.

Dayton Section: Capt. George P. Johannes, Robert LeRoy Lemmon.

Detroit Section: Charles R. Barrick, Harry L. Keeler, Jr., Alvin B. Richards.

Hawaiian Section: William A. Baddaky, Jack R. Doolittle, Simes Thurston Hoyt, Setsuji Kawamura, John Colwell McLaughlin, James Munro, Joseph B. Stickney, Louis Martin Szilezy, Cady Lynn Thornton.

Metropolitan Section: Warren B. Brady, John E. Hickok, S. P. Kemm, Kenneth W. Lussen, Morton Pomeroy Matthew, Orest A. Maykar, David W. Rice.

New England Section: Lt. (jg) Thaddeus Martin Alexander, Charles H. Meeker, R. Douglas Smith, James L. Webb, Jr.

Northern California Section: Joseph Frederick Carpenter, Elvin B. Lien, Major Joseph N. Raymond, C. R. Stanley, Ernest L. Winkler, Henry Carl Witt.

Philadelphia Section: Harry Joseph Fisher.

Pittsburgh Section: Joseph Gerald Hobson, W. L. Murphy, Lt. Edward C. Mutschler.

St. Louis Section: Monroe C. Alves, Samuel Bosley Parsons.

Southern California Section: Paul Richard Belanger, Richard E. Calkins, John F. Callahan, Francis S. Coppel, Paul J. Duvall, Orville W. Freeman, George A. Honzik, Carl L. Kieldsen, Albert George Martin, Ross Edward Morrow, Francis H. Ott, Lloyd James Pittman, Thomas Keith Radcliffe, Jean D. Rochfort, James M. Smith, Herman Van Dien Stewart, James H. Williams, William A. S. Wright, Arthur H. Yerxa, Jr.

Southern New England Section: Charles E. Martin, Jr.

Washington Section: Charles Garland Dillard, Edward John Eyring, Paul R. Lauritzen, Wilbur Monroe Loving, Lt. John Philipp Milford Reid, Franklin Harbaugh Swenson, Herbert Dewey Traylor, Reed I. West.

Western Michigan Section: John G Yates.

Wichita Section: Walter J. Kish.

Outside of Section Territory: John H. Clarey, Hugh H. Hendrickson, Donald Raymond Long, Claude M. McCue.

Foreign: Clifford Carr, Sudan; Arthur Halliday, India; Albert Edmund Moreillon, England; Percival Edward Thomas, England.

NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between Aug. 10, 1945, and Sept. 10, 1945.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section: Bertram W. Gore, Jr. (J), George Charles Milan (J).

Buffalo Section: Florian Gurbin (M), Robert A. Wolf (M).

Canadian Section: Norman A. Eager (A).

Chicago Section: Mark L. Blair (M), Clarence H. Brown (A), George E. Franck (M), Woodrow A. Hasbany (M), Russel A. Morris (A), Kenneth L. Mulholland (J), Jack R. Saylor (J), Norman B. Tichenor (A), Irving F. Veltum (A), John Vernerd Venema (J), Charles E. Wolmer (J).

Cincinnati Section: Lee A. Roth (A), F. E. Whitacre, Jr. (J), John W. Wollering (A).

Cleveland Section: Russell S. Atkinson (A), William Marsh Baldwin, Jr. (J), Laurence H. Flora (A), Charles Vincent Harvey (A), Ernest R. Johnson (M), Bernard Madow (J), Michael Joseph Markowski (J), National Refining Co. (Aff.) Representative: F. J. Sargent; Bert E. Price (M), John A. Ryan (A), Edmund E. Wood (J).

Dayton Section: A. B. Reese, Jr. (M), James Edw. Patrick Sullivan (J), Roger H. Walton (SM).

Detroit Section: Paul Butler Best, Jr. (J), Capt. Charles Edwin Stratford Chapman (FM), Fred Madison Cousins (M), Capt. Jose Luiz Palhares dos Santos (A), William Warren Dronberger (J), Donald E. DuPerow (M), C. J. Erb (A), Joseph W. Eskridge (M), Eugene B. Etchells (M), John A. Geisler (A), Emile P. Grenier (M), Joseph Gurski (M), Herbert L. Hornbeck (M), Raymond A. Hudson (M), Stephen Charles Islander (A), Roger M. Kyes (A), Edward Latta (M), Earl D. Loomis (A), Don D. Mott (J), Charles Harry Phillips (FM), William J. Resch (M), W. J. Rawnsley (FM), Robert B. Rothwell (M), Roy F. Weeks (M), Philip C. Wood (J), Kwok-Wan Yip (J).

Hawaiian Section: George W. Estes (A).

Indiana Section: William H. Crouse (M), Robert H. Hill (M), Peter P. Wood (A).

Kansas City Section: Spencer Deming (M).

Metropolitan Section: Benjamin B. du Pont (J), Fred L. Elsaesser (J), David J. Fraade (J), Chris J. Frey (M), Ezra Grossman (A), William C. Howell, Jr. (J), Arthur Hull-Ryde (A), William E. Klein (A), Elwin F. Lindsley (J), David W. Paull (J), George Plossl (A), Edward H. Regan (A), William E. Spearman (J), Edward John Willems (A), Raymond F. Wilson (A).

Mid-Continent Section: Harold A. Cook (J), Herbert D. Putnam (M).

New England Section: John J. Manning (A).

Northern California Section: 2nd Lt. James A. Blayney (J), Louis Kresse Burns (A), Harold Frank Doty (A), George K. Floroff (J), George Horace Hammond (A), Patrick Martin Morrow (A), Carroll Reeves (A), Edward Smith Ross (M), Jackson R. Stalder (J), Orley R. Stephenson (A), Thomas J. White (M).

Northwest Section: Henry E. Harris (A), Leonard W. Kowalsky (A), Paul P. Olson (M), Chas. A. Seiler (A).

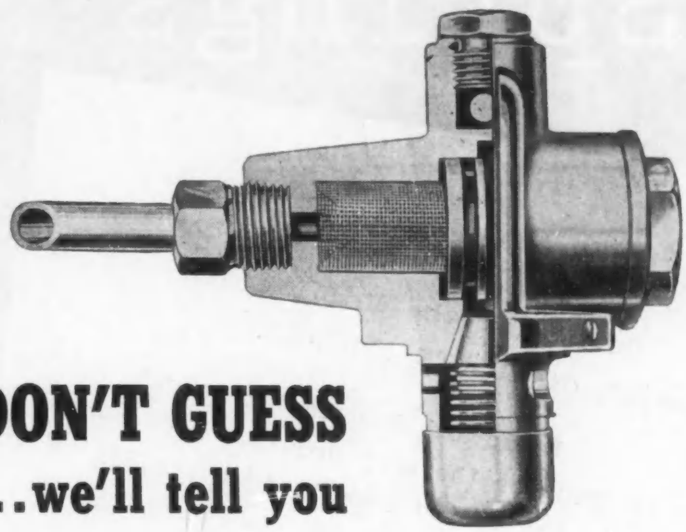
Oregon Section: Tom E. Allen (A).

Peoria Section: Arthur E. Lux (M).

Philadelphia Section: Oliver E. Rodgers (M).

Pittsburgh Section: E. H. Kanarr (A).

Southern California Section: Leonard E. Austin (M), George H. Coulson (A),



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...and this is a booklet we have prepared to tell every design engineer, manufacturer, distributor, or user of gasoline and Diesel engines the entire story of VISCO-METER*. Write, wire or phone for your copy. If you say so, a VISCO-METER* engineer will deliver it.

VISCO-METER

Peter B. Erwin (A), Thos. C. Farris (M), Goodyear Tire & Rubber Co. of Calif. (Aff.) Representatives: Ray A. Barmore, Richard W. Bell, Charles J. Roese; William Day Groseclose (M), Charles B. Hatler (J), P. A. Haythorne (J), John F. Lyons (J), E. Gilbert Mason (M), Edward Michael Nash (J), Norman F. Nichol (A), William Henry Reineking (M), Maynard S. Reynolds (M), A. Robertson (M), Harry Bernard Seed (A), Frank H. Smith (J), Justin H. Smith (A), Edward E. Stabile (A), Carl J. Strid (M), Verne Elroy Sylvester (M), T. Ross Welch (M), Robert B. Young (J).

Southern New England Section: Joseph A. Brosseau (J), Joseph I. Robinson (J).

Spokane Group: Glen G. Hays (A), George F. Hughes (A), Loring Harvey Meacham (A), Frank A. White (A).

Syracuse Section: Donald Charles Appelby (J), Frank B. Chadwick (A), Charles William Simmons (M), John D. Williams (M).

Texas Section: Lemuel Alden Wilson, Jr. (J), Munson Henry Tix (J), Robert C. Pote (M), Fred Marion Peterson (J), W. C. Hildebrand, Jr. (A), O. W. Brown (A).

Twin City Group: Willis H. Gille (M), Orrin B. Johnston (M).

Washington Section: Thomas W. Bishton (M), B. H. Hasselbring (M), Charles F. Warner (SM), Alfred B. Spain (A).

Outside of Section Territory: Ernest Ambler (J), John Forbes (A), Ensign Russell W. Rand (J), Beryl Van Lierop (J), Clarence Henry Wiegman (M), William Henry Wilson, Jr. (J).

Foreign: Charles Trotwood Salt (FM), England; Brigadier Gerald Richard Taylor (FM), South East Asia Command; Col. Stephen John Thompson (FM) England.

Springs

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The basic and fundamental manual developed for the Army Ordnance Department by the Spring Committee of the SAE War Engineering Board, is now being offered for wider distribution.

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About SAE MEMBERS

cont. from p. 37

CAPT. W. COYLE COCHRANE, Ordnance Department, recently reverted to inactive status, has been appointed district manager for Perfect Circle Co. in charge of the western Pennsylvania and West Virginia territory with offices in Pittsburgh. He was ordered to active duty in 1942, and assigned to the Quartermaster Motor Transport. He was stationed successively at Holabird, Md.; Atlanta, and the New York Port of Embarkation. He assisted in developing the procedure for processing Army vehicles for overseas, and designed the processing facilities at Bayonne, N. J. He returns to Pittsburgh where he had been active in the SAE Pittsburgh Section, and was editor of its *Broadcaster* while with the Cities Service Oil Co. as commercial sales engineer.

Capt. W. Coyle Cochrane

R. I. RAYCROFT has been appointed general sales manager of Firestone Tire & Rubber Co. of Canada, Ltd. Mr. Raycroft started with the Firestone organization in 1923 as a general line salesman. Three years later he was promoted to the position of manager of truck and bus tire sales, and in 1928 was appointed manager of manufacturers' sales, which position he has held since then. For the past six years he has had the added responsibility of being in charge of Firestone War Products.

B. G. BOWDEN has set up his own business, Allen-Bowden, Ltd., of Leamington Spa, Warwickshire, England, of industrial designers and consulting engineers specializing in work for the automobile industry. He was formerly chief body engineer with Humber, Ltd., Coventry, England.

Formerly chief model test engineer at Dodge Chicago Plant, Division of Chrysler Corp., Chicago, **J. E. KLINE** is now in the sales technical service department of Standard Oil Co. of Ind., same city.

Previously in the engineering design department, Stout Research Division, Consolidated Vultee Aircraft Corp., Dearborn, Mich.,

There may be a Diesel locomotive... a car, truck or bus in this room

Section of Hyatt Engineering Laboratory. At right—one of many test fixtures. Hyatt bearing being given an endurance test.

EACH DIFFERENT TYPE of application makes its own special demands of Hyatt Roller Bearings—with such destructive forces as speed, impact, radial or thrust loads, and others—as well as conditions of moisture, wetness, heat, cold, dust, dirt.

It is traditional to build Hyatts with endurance to outlast the equipment for which they are designed. Our way of making sure of their capacity to do so is to simulate the conditions of the job—whether it's that of a massive locomotive journal box, an automotive differential, transmission or wheel—in our 24-hour-a-day testing laboratory.

Here, dozens of individual tests go on all the time—even to running bearings to destruction to prove their correctness of design.

Any bearing, in any stage of production may be picked for these tests by Hyatt's roving test engineers. This random selection is added assurance to the Hyatt Roller Bearing user that both workmanship and metallurgical standards are adhered to throughout the entire manufacturing process.

Hyatt engineers gladly consult with you on the selection of the proper Hyatt Roller Bearings for your product. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

CHESTER G. VENDITTY is now a radio technician first class in the U. S. Navy and is stationed at Great Lakes, Ill.

ROBERT D. WILLS is now a private in the U. S. Army, and may be reached at the 87th Infantry Training Battalion, Camp Maxey, Tex. Pvt. Wills was formerly assistant plant engineer, Morse Chain Co., Detroit.

R. A. WELLS has been transferred from the Dayton, Ohio, branch of Wright Aeronautical Corp. to the Paterson, N. J., branch of the company where he is serving in the field engineering division.

HORACE A. TAYLOR, who was formerly with the Allison Division of General Motors Corp., installation section, Indianapolis, Ind., is now design engineer with Schwitzer-Cummins Co., same city.

Formerly a student member at C. I. T., Pasadena, Calif., JOHN M. GERTY is now a seaman second class in the USNR.

C. H. REYNOLDS, vice-president of the Sheffield Corp., Dayton, Ohio, has been selected by the War Department as a member of a group of American business men to inspect industrial plants in Germany and other European countries. He is now in Europe and is expected to remain for several weeks.

FREDERICK T. ROWLAND, Standard Steel Spring Co., has been transferred from the Armor Plate Division in Detroit where he was process engineer to the New Castle Plant of the company in New Castle, Pa., where he holds the position of spring engineer.

C. T. S. CAPEL, who had been technical consultant in South Africa for a number of British companies, is returning to Great Britain where he will be associated with the Hawker-Siddeley Aircraft Group. In the future he may be reached at Nuneaton, Warwickshire, England.

S/SGT. HENRY W. COOPER, U. S. Army, has been transferred from the Personnel Replacement Depot, Camp Beale, Calif., and may now be contacted c/o Postmaster, San Francisco.

GROVER LOENING, recently appointed aeronautical consultant, National Advisory Committee for Aeronautics, has been directed to proceed with a survey of civil aviation. The purpose of the survey is to suggest additional lines of research for the NACA to follow to be of the greatest usefulness to the private plane and airline field.

Formerly sales manager, Whipple & Rattray, New York City, CHARLES T. STORK is now associated with Consolidated Shipbuilding Corp., same city.

H. C. McCASLIN has joined Graham-Paige Motors Corp., Detroit, as chief engineer. Mr. McCaslin will direct engineering on the "Frazer," one of the two new cars to be produced by the Graham-Paige organization. Before coming to Graham-Paige, Mr. McCaslin was chief engineer of Willys-Overland Motors, Inc., where he played an important role in engineering passenger automobiles and the military and civilian jeeps.

H. C. McCaslin

Formerly student members at C.I.T., Pasadena, Calif., JAMES D. BURKE, DONALD L. FRANCIS, MARSHALL E. McELHANNON, JOHN D. McKENNEY, JOHN F. NICHOLS, JOHN H. NICHOLS, HARRIS M. SCHURMEIER, and MERLE G. WAUGH have changed their address from apprentice seamen, College (V-12) Naval Training Unit, Pasadena, Calif., to aviation cadets, 10th Battalion, U. S. Navy Preflight School, St. Mary's College, Calif. TERRY M. PRUDDEN, formerly at Glendale, Calif., may also be reached at the same address.

Formerly a student member at C.I.T., Pasadena, Calif., RAYMOND CLYDE GERBER, JR., is now in the USNR and is attending Midshipmen's School at Notre Dame, Ind.

TOM ELLEMAN has organized his own firm, the Elleman Engineering Service Co. of Defiance, Ohio. Mr. Elleman was formerly in the engineering department of Continental Motors Corp., Muskegon, Mich.

REX J. LEON DUTTERER, who had been chief engineer with Motor Master Products Corp., Chicago, is now in charge of production and development of special products of the Hastings Mfg. Co., Hastings, Mich.

R. J. MOFFETT is now technical assistant to the general manager of Canadian Car & Foundry Co., Ltd., Montreal, Que., Canada. He was formerly chief engineer and sales manager of Canadian Propellers, Ltd., same city.

Formerly a student member at C.I.T., Pasadena, Calif., BRUCE R. VERNIER has graduated with a B.S. in mechanical engineering and is now in the USNR and is attending Midshipmen's School at Cornell University, Ithaca, N. Y.

CHARLES L. ADAMS, who was formerly an engineer with Bendix Aviation Corp., South Bend, Ind., is now an ensign in the USNR and is stationed at the U. S. Naval Air Station at Patuxent River, Md.

NORMAN O. PAQUETTE, Stevenson & Kellogg, Ltd., has recently been promoted from senior engineer of the Toronto, Que., Canada, branch to chief engineer in charge of all West Coast operations, with headquarters at Vancouver, B. C., Canada.

W. HARRY FAINT is now tool designer, General Motors of Canada, Ltd., Oshawa, Ont., Canada. Mr. Faint was formerly senior draftsman of Regina Industries, Ltd., Regina, Sask., Canada.

H. L. HINCHCLIFFE, Shell Oil Co. of Canada, Ltd., Toronto, Ont., Canada, has been promoted from the position of division lubricants engineer to assistant operations manager.

Formerly at the Bureau of Ships, New York City, LT. (jg) R. H. LEBOW, USNR, is now stationed at the Naval Repair Base at San Diego, Calif.

GERHARD G. THIEM is now design draftsman with Frederic Flader, Inc., Buffalo, N. Y. He was formerly designer with Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn.

HENRY P. VAUGHAN has resigned from his position of engineer in the experimental section of the Detroit Diesel Division, General Motors Corp., Detroit, and will spend the next few months on his farm at Clinton, Mich.

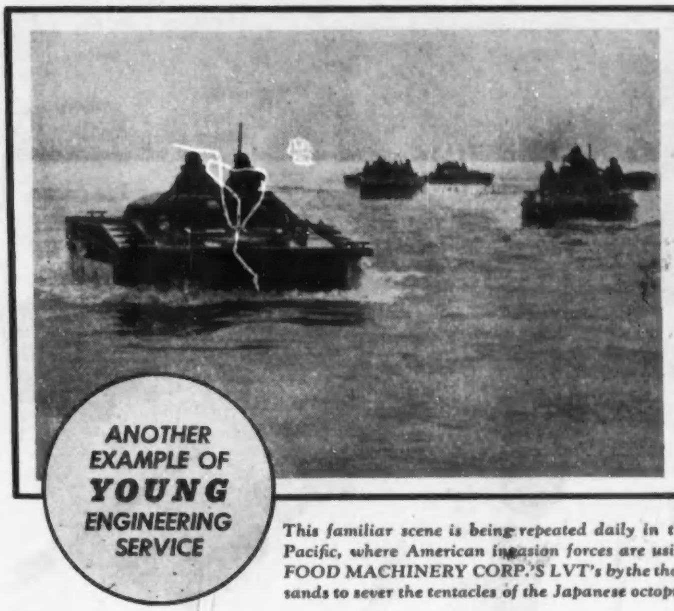
HAROLD A. BACKUS has been named chief engineer of the Stow Mfg. Co. of Binghamton, N. Y. Mr. Backus was previously project engineer with Kellett Aircraft Corp., Plant No. 2, Upper Darby, Pa.

RALPH W. DOBBINS is now planning engineer, ATC aircraft, Pan American World Airways, Inc., Miami, Fla. He was formerly junior engineer, motor shop, and assistant to chief, engine overhaul section of the same company.

Formerly project engineer with Bendix Products Division, Bendix Aviation Corp., South Bend, Ind., RICHARD J. BELL is now sales engineer with the Newaygo Engineering Co., Newaygo, Mich.

JAMES IRA CLOWER has been appointed professor of machine design at the College of Engineering, West Virginia University, Morgantown, W. Va. Mr. Clower is currently on terminal leave from the

KEEPING THE "TOKYO EXPRESS" ROLLING



This familiar scene is being repeated daily in the Pacific, where American invasion forces are using FOOD MACHINERY CORP.'S LVT's by the thousands to sever the tentacles of the Japanese octopus.

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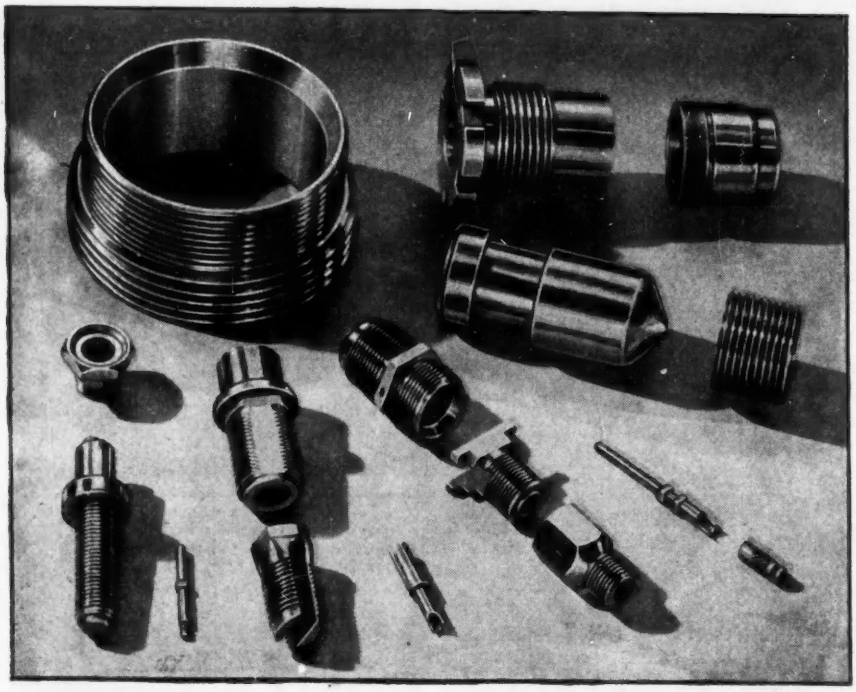
Ordnance Department, with which he has been serving since January, 1943. During his tour of duty with the Ordnance Department, Mr. Clower supervised and conducted research projects in the design and development of special Ordnance items, particularly hypervelocity armor piercing shot. Prior to entering the Service, he was professor of machine design at Virginia Polytechnic Institute, Blacksburg, Va.

Formerly senior experimental test inspector, Dodge Chicago Plant, Chrysler Corp., Chicago, **DONALD H. ROBERTS** is now service mechanic with Nieburger Chevrolet Co., same city.

S. K. HAMBLING has been named research engineer, Alvis, Ltd., Coventry, Warwickshire, England. Mr. Hambling was formerly senior research engineer with Shell Refining & Marketing Co., Thornton Engine Laboratory, Chester, England.

Formerly purchasing agent with American Airlines, Inc., LaGuardia Field, N. Y., **H. van der GAAST** has been appointed assistant general purchasing agent for Taca Airways, Inc., New York City.

FREDERICK H. ROEVER has severed his connection as superintendent of instruction with Parks Air College, Inc., East St. Louis, Ill.



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OBITUARIES

H. E. Clemens

H. E. Clemens died recently at the age of 59. Mr. Clemens had been chief automotive adviser, U. S. Army Ordnance Department, Ninth Service Command at Fort Douglas, Utah.

Mr. Clemens graduated from Purdue University in 1908 with a degree of B.S. in M.E. For a number of years, Mr. Clemens was general superintendent of the Motor Transit Co., Los Angeles, during which time building of new equipment, maintenance, and the operation of all shops was under his supervision.

Edward S. Evans

Edward S. Evans, president of the Evans Products Co., Detroit, died Sept. 6 in his home after a short illness. Mr. Evans was 66 years old.

Mr. Evans – industrialist, inventor, and financier – achieved a leading position as a transportation expert and manufacturer of a variety of special products and in the field of aviation. He founded the National Glider Association and was one of the pioneer promoters of gliding in this country. Nineteen years ago, to show the practicability of the transport plane, he circumnavigated the world and set a world record.

Frank A. Donaldson

Frank A. Donaldson, president of the Donaldson Co., Inc., St. Paul, Minn., died recently at his home in Minneapolis. Mr. Donaldson was 56 years old. A native of Rochester, Minn., Mr. Donaldson was a graduate of the University of Minnesota college of engineering. While he was field engineer for the Bull Tractor Co., he invented the first air cleaners ever applied to tractors. He was a director of the National Association of Manufacturers.

John L. Wierengo

John L. Wierengo, advertising and publicity director, Continental Motors Corp., Muskegon, Mich., died recently at the age of 57. Mr. Wierengo was taken ill with appendicitis and later with pneumonia.

In 1917 Mr. Wierengo established an advertising agency under the firm name of John L. Wierengo & Staff. He gave up this business to become public relations director of the Continental organization in November, 1940. A native of Muskegon, he received his degree from the University of Michigan in 1909.

Claud R. Crooks

Claud R. Crooks, vice-president of the Honan-Crane Corp., Lebanon, Ind., died recently at the age of 52. Mr. Crooks principal work with the Honan-Crane Corp. was to make surveys and to analyze lubricating problems and mechanical failures in prime mover equipment, machine tools, and so forth. Oil purification equipment would then be applied if it were decided that the trouble was due to lubrication failure.

Mr. Crooks had been an associate member of the SAE since 1943.

PAUL R. KOLBE is now affiliated with Fredric Flader, Inc., Buffalo, N. Y. He was formerly specification engineer with the Studebaker Corp. of South Bend, Ind.

Formerly at Muroc Flight Test Base, Muroc, Calif., MAJOR E. H. GRAHAM, U. S. Army, is now stationed at Cascade, Colo.

JOHN F. CRANE has been appointed technical aide, Air Technical Service Command, U. S. AAF, Powerplant Laboratory, Drafting and Specifications Division, Wright Field, Dayton. He was formerly design engineer at the Navy Lockheed Service Center, Van Nuys, Calif.

Formerly field representative, Pesco Products Co., Cleveland, **ELMER P. GUTH** is now field engineer with the Weatherhead Co., same city.

ARNOLD ROBB is now affiliated with the Aro Equipment Corp. Bryan, Ohio. He was formerly assistant customer engineer with Bendix Aviation Corp., South Bend, Ind.

CHARLES B. **BRULL** has been appointed senior engineer with B-W Superchargers, Inc., Milwaukee, Wis. He was formerly engineering manager with Stratos Corp., Babylon, L. I., N. Y.

LT. GRAY FARR, USNR, is now stationed at the Fleet Operational Training Command, Naval Operating Base, Norfolk, Va. He was formerly a member of the Amphibious Training Command at the same base.

CAPT. C. H. **SCHILDHAUER**, USNR, is now stationed at the U. S. Naval Air Station at Patuxent River, Md. He was formerly assistant director, plans and logistics, U. S. Navy Department, Naval Air Transport Service, Washington.

Formerly pre-midshipman, U. S. Naval Academy, Annapolis, Md., **LAWRENCE G. PELZ** is now an ensign in the USNR and may still be reached at Annapolis.

LAWRENCE P. **TANGUAY** is now affiliated with the Bechteh-McCone Corp., Aircraft Division, Birmingham, Ala.

Formerly at Chanute Field, Ill., **CAPT. EDWARD A. SUTHERLAND**, U. S. Army, is now stationed at Headquarters, Air Technical Service Command, Wright Field, Dayton, Ohio.

CLARENCE H. **SPECK** has been named manager of pliofilm research at Goodyear Tire & Rubber Co., Akron, Ohio. He was formerly chief research engineer at Higgins Aircraft, Inc., New Orleans, La.

Formerly metallurgical engineer (alloy) Carnegie-Illinois Steel Corp., Pittsburgh, Pa., **A. L. KAYE** is now affiliated with the Beckman Supply Co., Hammond, Ind., in a similar capacity.

PVT. JOHN J. **PALERMO**, U. S. Army, has been transferred from Camp Lee, Va., to Fort Belvoir, Va., where he is in the Engineer Training Battalion.

Formerly carburetion engineer, Delco Radio Division, General Motors Corp., Kokomo, Ind., **CHARLES K. McCONNELL** is now connected with the Rochester Products Division of General Motors Corp., Rochester, N. Y.

ALLEN T. WELCH is now bakery engineer for H. C. Rhodes Bakery Equipment Co., Portland, Ore. Mr. Welch was formerly chief engineer, Eddy's Associated Bakeries, Helena, Mont.

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Previously in the quality engineering department of Pratt & Whitney Aircraft, Division United Aircraft Corp., East Hartford, Conn., **CONRAD R. ROBIDOUX** is now test engineer in the testing laboratory of International Plainfield Motor Co., Plainfield, N. J.

FRANCIS R. TRUBY is now lubrication engineer, Army Service Forces, Office of the Chief of Transportation, Technical Publications Branch, New York City. He was formerly technical representative, lubricants department, Shell Oil Co., Inc., same city.

ROBERT BEST, who had formerly been research engineer with Continental Oil Co., Ponca City, Okla., is now test engineer, Fredric Flader, Inc., Buffalo, N. Y.

B. F. SOUTH is now affiliated with Pontiac Motor Division of General Motors Corp., Memphis, Tenn. He was formerly manager of maintenance, Dixie Greyhound Lines, Inc., same city.

Formerly with the Foreign Distributors Division of General Motors Corp., Honolulu, T. H., **H. R. NOGUEIRE** has been transferred to General Motors Overseas Operations, New York City.

AXEL WARNER ANDERSON, an apprentice seaman in the USNR, is now stationed at the U. S. Naval Training Center at Great Lakes, Ill. Before joining the Navy, he was senior test engineer with Wright Aeronautical Corp., Paterson, N. J.

DALE O. HULL has been named assistant professor of extension agricultural engineering at Iowa State College, Ames, Iowa. Mr. Hull was formerly lubricating engineer with Standard Oil Co. of Ind., Chicago.

EDWAR H. MOLL has been elected president of Lotus China & Glass Co., West Springfield, Mass. Mr. Moll was formerly vice-president of manufacturing of the American Bosch Corp., Springfield, Mass.

MAJOR GERALD C. DUNBAR, U. S. Army, has been transferred from Aberdeen Proving Ground, Aberdeen, Md., and may now be contacted c/o Postmaster, San Francisco.

ROBERT McTARSNEY is the owner of Indiana Wire & Toy Products, Indianapolis, Ind. He was formerly district supervisor, service department, Allison Division, General Motors Corp., same city.

Formerly associated with the Pacific Car & Foundry Co., Renton, Wash., **ERNEST J. MacNAUGHTON** is now automotive body layout draftsman, Reo Motors, Inc., Lansing, Mich.

NEWELL H. McCUEN, a radio technician third class in the U. S. Navy, is now an instructor at the Naval Training School, Pre-Radio Material, Wright Junior College, Chicago, Ill. He was formerly at Radio Machinist School, Naval Research Laboratory, Washington.

Formerly a student member at the University of California, Berkeley, Calif., **EUGENE D. HAMILTON** is now a member of the USNR.

DARWIN L. HOLBROOK, Fafnir Bearing Co., has been transferred from the New Britain, Conn., branch of the firm, to Los Angeles.

WILBUR F. FUSSELMAN is now associated with Wilmar Products, Maplewood, N. J., in the capacity of senior partner and sales engineer. Mr. Fusselman was previously designer with Titeflex, Inc., Newark, N. J.

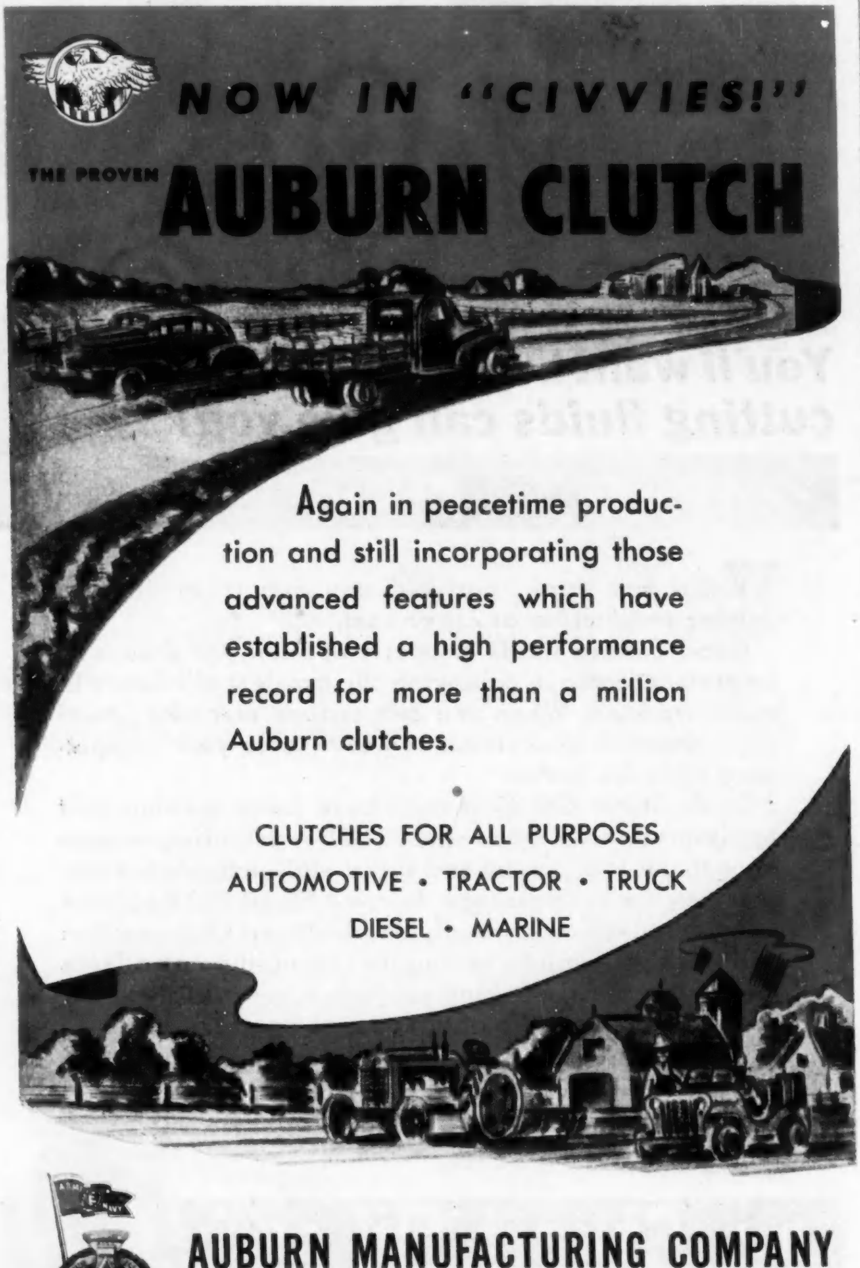
FRANK W. WELLS has been named assistant general manager of the U. S. Spring & Bumper Co., Los Angeles. He was formerly general manager, manufacturing, of Sawyer Electrical Mfg. Co., same city.

Formerly manager of the new products department of Firestone Tire & Rubber Co., Akron, Ohio, **WILLIAM A. SMITH** has been appointed sales engineer for the same company.

Formerly test engineer in the experimental test department, Allison Division, General Motors Corp., Indianapolis, Ind., **L. G. DENNING** is now affiliated with B. W. Superchargers, Inc., Milwaukee, Wis., in the engineering department.

Q. C. WOODS is now connected with the Automotive Equipment Co., Ltd., of Montreal, Que., Canada. He was formerly branch manager of Firestone Tire & Rubber Co. of Canada, Ltd., Toronto.

Formerly sales engineer, Eberhard Mfg. Co., Division of Eastern Malleable Iron Co., Cleveland, **T. A. SCANLAN** has been transferred to the Naugatuck, Conn., branch of the same firm.



JOSEPH MONDSCHEIN, an air cadet in e U. S. AAF, is now stationed at Maxell Field, Montgomery, Ala. He was nsferred from Turner Field, Albany, Ga.

Formerly general purchasing agent, hwitzer-Cummins Co., Indianapolis, Ind., ARRY E. BLASINGHAM is now presient of Harry E. Blasingham & Associates, me city.

PAUL H. VAN OSDOL, Allis-Chalmers Mfg. Co., has been transferred from field gineer in the Springfield, Ill., branch of e firm to assistant industrial service manger of the Tractor Division, Milwaukee, Wis.

ALONZO P. MERCIER, a lieutenant lonel in the U. S. Army Air Forces, is now ationed at Headquarters, Air Technical ervice Command, Wright Field, Dayton, hio. Colonel Mercier has recently returned om an overseas assignment.

EUGENE B. EIPPER has left Andover otors Corp., Elmira, N. Y., to join the Wilkening Mfg. Co., Philadelphia, as assisnt chief engineer.

Formerly engineering officer, Section B, Office, Warrensburg, Mo., 2ND LT. JOSEPH G. ROSE, III, U. S. Army Air Forces, now engineering officer, test pilot, and is ationed at Kellogg Field, Battle Creek, Mich.

S. J. WHEELER is now associated with the Synchro-tac Instrument Co., Pty., Ltd., Carlton, Melbourne, Australia, as instrument perintendent. Mr. Wheeler is also proprietor of the Instrument Test House of Ascot. Mr. Wheeler had formerly been chief nstrument engineer for the Department of Aircraft Production, from which he has recently been released by the Australian Government.

DANIEL M. BROWN, U. S. Army, has been promoted from private to technical corporal and may be contacted at the QM Petroleum Salvage Detachment, c/o Postmaster, New York City. Before entering the Army, he was associate engineer with the Armour Research Foundation, Chicago.

Formerly regional representative, division of Transport Personnel, Office of Defense Transportation, Atlanta, Ga., NORMAN C. RAABE may now be reached at Warton American Technical School, England.

ROY P. TROWBRIDGE, a private in the U. S. Army, is now attached to the Armored Board Detachment, Fort Knox, Ky. Before his induction, he was project engineer with General Motors Corp., Milford, Mich.

GEORGE H. LIESER, who was formerly service engineer with Vander Horst Corp. of America, Cleveland, is now field representative with the Vapor Blast Mfg. Co., Milwaukee, Wis.

WILLIAM A. McCONNELL has been appointed mechanical design engineer, Systems Research Laboratory, Harvard University, Cambridge, Mass. He was formerly project engineer at General Motors Proving Ground, Milford, Mich.

FREDERICK T. STERLING is now airline pilot with Pan American Grace Airways, Inc., of Miami Springs, Fla. Mr. Sterling was formerly assistant contract manager with Curtiss-Wright Corp., Airplane Division, St. Louis, Mo.

CLAUDE C. CROSIER has been appointed Midwest district engineer for the Kaydon Engineering Corp. of Muskegon, Mich. Mr. Crosier was previously district manager of the Torrington Co., Bearings Division, Chicago.

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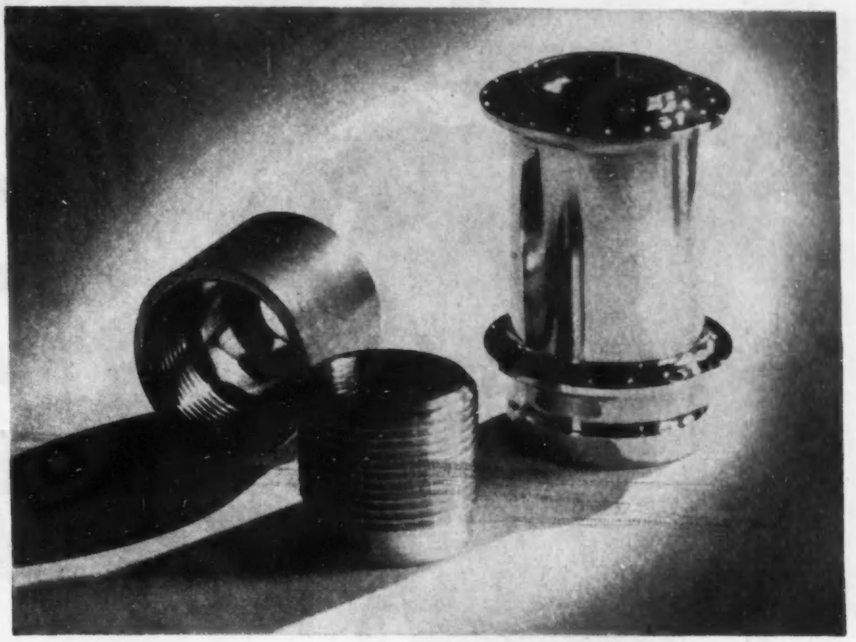
We make metal parts and assemblies in quantity

We also engineer, design and develop if desired



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